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EDITORIAL NOTES

SALIENT ITEMS AETAT. 5 YEARS

For five years now, number by number, Salient Items has been compiled regularly by one individual member of the bureau, not the editor, and, so far as the editor can judge, it has been and is an extremely popular and useful feature of the journal.

But its compilation is, to put it mildly, not everybody's cup of tea, nor indeed would many of us have the nerve or knowledge to attempt it.

That it has been successfully attempted and accomplished is the comment of every visitor to the bureau, who already reads its journal, and is frequently affirmed in letters from correspondents on other subjects. The present compiler, moreover, is likely to remain in the bureau for some years to come, possibly with additional responsibilities.

The compiler feels, however, and the editor agrees with him, that the dangers inherent in its continued compilation should be realized by its readers and that their advice should be sought.

The first danger, and one that the present editor does not consider of a wholly disastrous nature, is that the process may tend to become purely mechanical—it is far from that at present—and that the information given may become dull and insipid. The answer to that might be that most of the information given in such a journal as this is bound to be remarkably dull, unless one happens to be interested in the subject.

But the second danger stressed by the compiler is a more cogent one. It is that certain aspects of horticultural science discussed in *Horticultural Abstracts* may now be neglected in Salient Items for the simple reason that he himself is naturally more interested in some aspects than in others and that he inevitably tends to bring these forward, whereas other equally important subjects may be neglected.

We should greatly welcome the frank expression of our readers' views, firstly on the desirability of continuing the feature beyond 1959, secondly on the validity of the compiler's self-imposed stricture regarding the possibly inadequate treatment of particular subjects, and lastly on ways in which Salient Items or, indeed, any other feature in *Horticultural Abstracts* might be improved.

THREE NEW PUBLICATIONS

Your attention is drawn to three very diverse new publications of the Bureau which should all be available by the time you receive this number of *Horticultural Abstracts*. They are:—*T.C.25.* R. L. Knight and Elizabeth Keep. ***Bibliography of Fruit Breeding and Genetics to 1955. Rubus and Ribes—A Survey.*** Demy 8vo., pp. 254, annotated bibl. 1,007. In it, papers on breeding, genetics and cytology are summarized in detail and the field is extended to include pomological descriptions, classification and synonymy of varieties and species and their disease and pest responses. Price 45s. or $6.80.

T.C.26. D. Akenhead. ***Horticulture in the British Commonwealth—An Outline 1958.*** Demy 8vo, pp. 63. This is based on notes received from Official Correspondents in 35 countries overseas and from research and advisory officers in the United Kingdom. In it an attempt is made to answer in skeleton fashion such enquiries as the following:—(1) Where is work being done on such and such a crop and its problems? (2) What horticultural work is in progress in a particular country, and (3) What and where are the research or experimental centres concerned with horticultural or plantation crop work in different countries? Price 10s. or $1.50.

Digest No. 1. G. E. Tidbury. ***Bulk Harvesting of Orchard Fruit.*** Demy 8vo, pp. 38 with 24 illustrations. This has been prepared with the active help and blessing of horticultural authorities in New Zealand, Australia, Canada and the U.S.A. It covers developments, both practical and experimental, on the handling of apples and other deciduous fruits and also deals in some detail with the very similar methods evolved for use in the citrus groves of Florida. Someone has rudely termed it a "lowbrow Technical Communication". If "lowbrow" means practical, we accept the term. Price 5s. or 80 cents.

INDEX

May we stress the fact that the yearly index follows almost at once and should help to render immediately available the information contained in Vol. 28.

SALIENT ITEMS, Vol. 28, No. 4.

ENVIRONMENT

Soils and their management:—The diffusion rate of oxygen through soil increases with aggregate size and affects plant growth and yield (3765). In orchards that are cultivated compaction by machinery is apt to be most pronounced 6–12 inches below the surface (3349). If this phenomenon is general, the findings reported in abstract 3350 would appear to suggest the advisability of carrying out some form of subsoiling operation before grassing down an orchard. Fortunately rotation problems rarely worry fruit growers, but they are an ever-present headache for the market-gardener (3627). The fruit research worker is, however, concerned with the problem of variability which arises when a new experiment is laid down on an old orchard site (3290).

Water:—Various aspects of transpiration in relation to soil moisture are considered in 3 papers (3236, 3238, 3760), and the effects of water deficit on plant metabolism in a fourth (3237). With apples growth cessation in mid-summer followed by flower bud initiation is attributed to the large leaf area, which creates a water stress regardless of the water supply available to the roots (3323). Water losses from cut flowers also receive attention (3916, 3917).

Light:—The extent to which leaves are exposed to light affects the proportions in which chlorophylls *a* and *b* are formed (3363) and also the extent to which the roots will absorb CO_2 (3240). The responses of plants to lights of different colour are many and varied (3241, 3242). Reflected light is not to be despised (3914).

GROWTH PHENOMENA

Gravi- and other morphisms:—Intriguing results are described of studies on the effects of gravity on the growth and flowering of trees and individual branches trained both vertically and horizontally (3320) and on the behaviour of black currant cuttings subjected to various centrifugal forces (3243). The term "photoperiod" usually conjures up visions of flower bud initiation or the prolongation of extension growth, but there are cases in which changes in day-length affect the form, as well as the amount, of vegetative growth (3873, 3995).

Roots:—Day-length can also affect root development and activity in *Nicotiana* species that are sensitive to photoperiod (3822). With tomatoes grown under glass two peaks of root growth have been observed (3754). With vines the absorption of water by roots in the early spring starts when soil temperatures are still well below those needed for the growth of new roots (3430).

Leaves:—The effects of removing certain leaves on the growth of plants and on the development of other leaves are described for lettuces and tobacco (3729, 3815). A method of measuring leaf area in tobacco is also reported (3813).

Flowers:—The idea that flower bud formation occurs in at least two distinct phases receives support from the results of a study on radish seed vernalization (3716). With peaches the second or developmental stage of flower buds can come to an untimely end if temperatures in autumn or winter are unfavourable (3329). With strawberry seedlings flowering can be greatly accelerated by seed treatment followed by short-day treatment of seedlings that have produced 5 or 7 leaves (3423). With apples blossoming dates are dependent on accumulated temperature sums above a base of 43° F. (3324, 3325).

Pollen:—The size of pollen grains is affected by temperature (3746). Where pollen is carried some distance by bees, desiccation occurring during the flight may be such as to destroy its viability (3665).

Fruit:—In one pineapple variety a close correlation exists between the weight of a specific leaf and the weight of the fruit reaped about 6 months later (4115). A study of what happens when peach fruits crack may interest some scientists (3331); possible ways of reducing cracking in cherries is more likely to interest growers (3287). Physiologists may care to note that apple fruit tissues can now be cultured *in vitro* (3244).

MACHINERY, EQUIPMENT AND METHODS

Mechanized harvesting:—A notable array of bulk bins, boom shakers, pick-up units and other equipment awaits the grower with good credit facilities. These deal with apples (3373), cherries (3380, 3381), figs (3387), lettuces (3735), olives (4042), peaches (3287, 3378), prunes (3382-3384) and walnuts (3456). As on one previous occasion, it is the tobacco people who sound a note of caution with an article entitled "When does a tobacco harvester pay?" (3847). And for those who lack credit or just don't like machines there is "Fruit-grower experience with 'pick-it-yourself'" (3379).

Packing:—Having somehow or other managed to harvest his crop the harassed grower is still faced with the problem of what containers to select for packing his apples (3374-3376, 3390), pears (3377), plums or prunes (3385, 3386) and even his watercress (3736). If he happens to produce raisins he will no doubt also need a grader (3449).

Miscellaneous machines:—For planting nursery stock (3278), disbudding vine rootstock cuttings (3433), soil fumigation (3279), sorting seeds (3682) and removing coffee mucilage (4099). In addition a dusting machine has been adapted to blow pollen around in vineyards (3444).

Apparatus and techniques:—Chambers are available for growing plants in a $C^{14}O_2$-treated atmosphere (3271) and for weighing growing sugar cane plants by means of gamma rays (4129). Other apparatus includes soil temperature tanks (3282), a light meter (3283) and devices for observing root growth and measuring trunk diameters (3284). Methods have been evolved for determining C^{14}-labelled ethylene (3753) and for pre-testing oranges for susceptibility to peel breakdown (4035).

Driers and drying:—Hops (3890–3892) and copra (4073–4075).

NUTRITION

Nutrient uptake:—In the inhospitable north falls in soil temperature result in reduced nutrient uptake by plants, but this reduction is not spread uniformly among individual elements (3769). P applied to the leaves of trees may be transferred *via* their roots to neighbouring trees (3266). Isotopes are a useful tool for determining the availability of chelated metals to plants (4013) and for studying nutrient absorption and movement in different stock-scion combinations (3312).

Nutrient diagnosis:—This heading represents a compromise between the terms used by two exponents of diagnostic methods applied to rubber (4119, 4120). Three other papers are concerned with the relationships between nutrient status and yields in blueberries (3412–3414).

Other aspects of plant composition:—Leaves that become chlorotic through iron deficiency possess lower dry weights and higher water contents than normal leaves (3466, 3470). Differences in leaf composition between plants grown under glass and in the open and between sun and shade leaves can be accounted for by the leaching effects of rain and dew (3340). However, this can hardly account for the non-appearance of rutin in greenhouse-grown tobacco (3829).

Boron:—Well represented by 5 papers (3256–3259, 3721).

Other trace elements:—Cadmium for vines (3442), cobalt for several plants (3260, 3722, 4121) and molybdenum and zinc for rubber (4122, 4123).

PLANT PROTECTION

Fungi and fungicides:—That curse of the banana grower, *Fusarium oxysporum* f. *cubense* appears in two new guises, first as a relatively feeble parasite needing the assistance of root injury or of a nematode before it can launch its attack (4055, 4056), and secondly in the even tamer role of a test organism for determining the probable phytotoxicity of spray oils to higher plants (4054). For the control of apple and pear scab the main emphasis at present appears to be on phenyl mercury compounds (3483–3485, 3490), but other materials, also being tested, include systemic dodecyl guanidines (3488) and isolates from *Penicillium* species that inhabit dead apple leaves (3489). Among other new fungicides of interest are a semicarbazone derivative of cycloheximide (3505) and an organic tin compound (3660). In Italy enthusiasm for non-copper fungicides in general, and for zineb in particular, continues unabated (3549–3554, 3781–3783); if called upon to do so in the cause of science the Bureau will not hesitate to sample the first bottle of guaranteed non-copper Chianti.

Storage diseases:—Ammonia gas and other chemicals for rhizopus rot of peaches (3397, 3398), impregnated box liners for gloeosporium rot of apples (3497) and mycostatin dips for gloeosporium rot of bananas (4060); or, with certain reservations, a good stiff dose of gamma radiation (3395).

A sluggish virus:—Despite its jolly name of dapple apple this virus has an incubation period that is too long to endear it to the impatient virus indexer (3476).

Resistant mites:—Red spider mites of the genus now known, temporarily no doubt, as *Panonychus* are clearly adaptable creatures. In the past they rapidly developed races resistant to parathion. Now it is the turn of demeton, and, what is worse, resistance to demeton apparently imparts an incredibly high degree of resistance to many other organic phosphates (3520, 4030).

Insecticides:—Investigations on the chemical control of fruit flies are complicated by the phenomenon of latent toxicity (3534) and by the fact that better kills sometimes result when sprays are directed onto plants other than the hosts it is desired to protect (3680). There are also snags in seed pelleting with chlorinated hydrocarbons (3644, 3704), and perhaps also in the use of systemic insecticides in hop gardens (3884).

Nematodes:—Those who may be disheartened by the news that nematodes can sometimes tolerate higher salt levels than their host plants (4021) may be cheered by the colourful prospect of fields planted in marigolds to suppress them (3517).

Soil sickness:—Phlorizin, a possible agent in the case of apples (3461).

Herbicides:—A water-in-oil formulation of 2,4,5-T with reduced spray drift (3572), and waste water from industry which is non-selective but presumably cheap (3573).

PROPAGATION

Seeds:—Two papers may help to explain the low viability sometimes encountered in coffee seeds (4080, 4081). With apples gas storage of the fruit may result in poor seed germination (3392). With tomatoes the moisture content of the seeds affects their response to X-ray treatment (3747). Studies on factors that control germination are reported for peaches, tobacco and oil palms (3317, 3808, 4106). Unneighbourliness is characteristic of certain vegetable seeds (3625).

Cuttings:—For several years past the dominant theme of this paragraph has been air humidity as maintained by mist or plastic covers. May one hazard a guess that the next step forward will concern the use of supplementary light to extend photoperiods during rooting and subsequent development (3972, 3982, 3991)? Another development, long overdue, is a full-scale investigation of the air-moisture-temperature relations of the rooting medium; in this connexion there are two papers that may serve to whet the appetite (3923, 3924).

Rootstock-scion relationships:—In vine grafts poor unions may be due to different rates of callus formation by stock and scion (3434). In pear-on-quince combinations the quality of the union may be reflected in structural abnormalities in the roots, which suggests that it may be possible to devise a method of assessing union structure without cutting down the tree (3314). With citrus the problem of stock-scion incompatibility, for many years lost in the mists of virology, has suddenly re-emerged into the light of day (4006). Among more exotic contributions there is an account of the odd behaviour of a tomato grafted onto a tree tomato (3744), and also a description of the normal development of zinnias grafted onto tobacco, which is attributed to the presence of nicotine in both plants (3934).

MISCELLANEOUS

Cement works:—No place to start market-gardening (3232).

Chironja:—An orange × grapefruit hybrid said to possess all the virtues of both (4004).

Compositae:—A classification of flower types (3909).

Dermatitis from mangoes:—An allergy to which Americans are more subject than most other races (4105).

Enraged Florida beekeepers:—Who complain that honey from introduced punk trees (*Melaleuca* sp.) is disgusting (3989).

Fat metabolism:—Further studies on oil palms (4107, 4108).

Grubbing unwanted vines:—With the aid of Vapam (3437).

Monoploid cucumbers:—Not likely to be of commercial value (3663).

Planting strawberries in summer:—Using cold-stored plants; a promising development in California (3422).

Stimulants:—Needed by the writer, but preferably something different from the petroleum products and ascorbic acid favoured by certain plants (3628, 3647, 3648).

MISCELLANEOUS.

General.

(*See also* 3285d, e, l, y.)

3227. SHEPHERD, F. W.
Rosewarne.
Agriculture, Lond., 1958, **45**: 201-6, bibl. 10.

Notes are given of current work at this N.A.A.S. Experimental Horticulture Station on provision of shelter, anemones, other bulbs, winter cauliflowers and spring cabbage, and brief mention is made of other flower crops, tomatoes and small fruits.

3228. KÁRPÁTI, Z.
Die Beziehungen zwischen natürlicher Pflanzendecke und gartenbaulicher Produktion in der Umgebung von Sopron. (**The relationship between natural flora and horticultural crops in the Sopron district.**) [French and Russian summaries $1\frac{1}{2}$ pp. each.]
Acta agron. hung., 1958, **7**: 429-56, bibl. 18, illus.

The Sopron district of Hungary lies across the dividing line of the floral provinces "Noricum" and "Pannonicum", which in the plant-geographical sense separates Central Europe from Eastern Europe. To the west, in Noricum, the main crops are winter apple, winter pear, walnut and plum and to the east vine and chestnut are grown.

3229. TIHOMIROV, B. A.
Data on economic plants used by Eskimoes on the south-eastern coast of the Čukotsk peninsula. [Russian.]
Bot. Žurnal, 1958, **43**: 242-6, bibl. 25.

In addition to lower forms, vascular plants of 17 families are used mainly as raw or cooked supplements to the fat and meat diet. Rosaceae is the most important plant family, represented by 5 edible species.

Climate and air pollution.

3230. DESSENS, H.
Étude des conditions d'ensemencement des nuages par générateurs au sol à Lukoléla. (**A study of the conditions for seeding clouds by ground generators at Lukolela.**)
[English summary $\frac{1}{2}$ p.]
Bull. Obs. du Puy de Dome, 1958, No. 2, pp. 43-56, bibl. 17.

An experiment in progress in the Belgian Congo is described in which a local increase in rainfall was achieved using a single intense source of AgI nuclei from a permanent site. Results in 1957 showed 100% increased precipitation in the experimental area and in the mean direction of winds below 1,700 m., and a 500% increase in the direction of winds between 1,700 and 5,000 m. These results were obtained on several occasions in spite of the great rarity of ice-forming nuclei in central Africa. The experiment is to be repeated in 1959 with a more powerful source of nuclei.

3231. CUILLÉ, J., AND OTHERS.
Le roséographe photographique. (**The photographic dew recording apparatus.**)
Fruits d'Outre Mer, 1958, **13**: 293-7, bibl. 3, illus.

In this study 2 methods are compared—one in which dew is collected in a funnel and, by dripping onto a balance, actuates a recording pen, and the other in which photographs of a suitable surface are taken automatically every $\frac{1}{4}$ hr. The former method failed to differentiate between rain and dew deposition and also appeared to be less precise than the photographic method. The circuit of the electric device which actuates the camera is given.

3232. FORTMANN, H.
Beitrag zur Frage der Einwirkungen von Staub aus Zementwerken auf Pflanzen und Boden. (**On the effect of dust from cement works on plants and soil.**)
Landwirtschaftsverlag GmbH., Hiltrup, 1957, $8\times5\frac{1}{2}$ in., pp. 65, bibl. 33, illus.

In studies on dust distribution near cement works deposits up to 2·5 g./m^2/day were found to occur. The effect of dust deposits on soil is to increase pH value. Deposits of ±0·7 g./m^2/day on glasshouses caused an 18% reduction on profit with lettuces. Germination and subsequent seedling growth of cabbage, kohlrabi and lettuce was reduced by 6–17% by cement dust deposits on the glass. With cyclamen, deposits resulted in loss of quality, viz. fewer flowers and elongated stems. At a rate of deposition of 2·1 g./m^2/day crop growing under glass was not economic.—Inst. Obstb., Univ. Bonn.

Biochemistry.

(*See also* 3285a, b, o, p, r, t, z, 3286f, g, 4165.)

3233. BRAUN, H. E.
Condensed direct current arc excitation for spectrochemical analysis of plant materials.
Analyt. Chem., 1958, **30**: 1076-9, bibl. 6, illus.

A method is described for the simultaneous quantitative determination of Ca, Mg, P, Fe, Mn, Cu and B in plant tissue. An acidic aqueous solution of the plant ash is impregnated into powdered graphite held in a cratered electrode. The electrode is dried and then excited by means of a condensed direct current arc. A comparison of spectrographic and chemical analyses of various samples within several plant species [including apple, cauliflower and celery] indicates that the accuracy of the method is adequate for routine quantitative analysis of plant tissue and the reproducibility of the method is excellent. [Author's abstract.]—Dep. Chem., Ontario agric. Coll., Guelph.

3234. DORNER, R. W., KAHN, A., AND WILDMAN, S. G.
Proteins of green leaves. VIII. The distribution of Fraction I protein in the plant kingdom as detected by precipitin and ultracentrifugal analyses.
Biochem. biophys. Acta, 1958, **29**: 240-5, bibl. 10.

Rabbit antisera against Fraction I protein from *Nicotiana debneyi* were prepared. Quantitative precipitin tests with the γ-globulin fraction of the pooled antisera showed no overlap between the regions of antigen and antibody excess, which was taken as evidence for the serological homogeneity of the reaction. A series of tobacco-cytoplasm samples from which Fraction I had been partly removed by means of ultracentrifugation in a separation cell was prepared. A positive correlation was shown to exist between the removal of Fraction I and the change in the antigen-dilution end-points of the samples. Cytoplasmic preparations from plants representing the major divisions of the plant kingdom were tested for the presence of Fraction I protein by means of analytical ultracentrifugation and precipitin analyses. Agreement between the two methods was good. The presence of Fraction I was shown in representative plants of the major divisions of the plant kingdom. [Authors' summary.]—Univ. Calif., Los Angeles.

3235. Parker, J.
Changes in sugars and nitrogenous compounds of tree barks from summer to winter.
Naturwissenschaften, 1958, **45**: 139, bibl. 4.

In a study of the causes of seasonal changes in cold hardiness of plants, determinations were made of nitrogenous and sugar constituents in a number of barks of mature and exotic trees growing wild in Westchester county, N.Y. From the results obtained it appears "that both proteins and sugars increase in autumn in all these tree barks and many free amino acids and amides go possibly into the production of new protein. The increase in sugars is probably accounted for by the hydrolysis of starch and this appears to be temperature controlled."—Yale Univ. School Forest., New Haven, Conn.

Physiology.

(*See also* 3285g, n, w, 3286b, 3725, 4172.)

3236. Bierhuizen, J. F.
Some observations on the relation between transpiration and soil moisture.
Neth. J. agric. Sci., 1958, **6**: 94-8, bibl. 12.

Transpiration rates of *Phaseolus vulgaris* were measured in pot experiments, at different soil moisture levels and light intensities. Transpiration increased with available moisture, becoming nearly constant at the higher levels. At the highest light intensity transpiration increased with available moisture content to a maximum at 16% moisture, but then showed a slight decrease; it is suggested that this effect is a result of O_2 deficiency at high moisture levels.—Inst. Land Water Management Res., Wageningen.

3237. Tombesi, L., and Calè, M. T.
Il metabolismo dei vegetali e le disponibilità idriche del suolo. Nota II. **(Plant metabolism and availability of soil moisture. Part II.)** [English summary ½ p.]
Ann. Sper. agrar., 1958, **12**: 459-71, bibl. 7.

Water deficiency increased respiration and polyphenoloxidase activity and decreased catalase and carboanhydrase activities in plants of *Vicia faba major*. Lack of water reduced N and P, but increased K percentages in the leaves, while reducing the combined content of these elements. It also increased the carbohydrate level in the plants. [For Part I see *H.A.*, 23: 61.]

3238. Stanhill, G.
Evapo-transpiration from different crops exposed to the same weather.
Nature, 1958, **182**: 125, bibl. 4.

The evapo-transpiration from grass and carrots was measured continuously from June to October 1957 in plots receiving only rainfall and in plots irrigated each day to restore the soil to field capacity. The cumulative evapo-transpiration was plotted against the cumulative evaporation from a standard evaporation tank, and with both crops the relation was linear. After the irrigated carrots had covered 40% of the ground surface there was an alteration in the slope of the linear relation between evapo-transpiration from the crop and evaporation from the water tank, and further increases in crop cover and height had no effect on rate of evapo-transpiration. With both grass and carrots receiving only rainfall the rate of the evapo-transpiration was reduced by 40% as compared with those that were irrigated. The differences in the amount of evapo-transpiration from the 2 crops could not be explained by the differences in the amount of energy used for growth, heat storage or for reflexion, so that large differences must have occurred in the amount of heat transferred to and from the air.—Nat. Veg. Res. Stat., Wellesbourne, Warwick.

3239. Closs, R. L.
The heat pulse method for measuring rate of sap flow in a plant stem.
N.Z. J. Sci., 1958, **1**: 281-8, bibl. 3, illus.

This method uses 2 thermocouples attached to the stem, with a small electric heater placed between them 1 cm. from the upper and 0·5 cm. from the lower. The heat pulse was obtained from a current of 5 amp. for 2 sec. through a single turn of 28 swg. constantan wire wound round the twig. This method was used satisfactorily on an excised poplar twig and on a growing salvia plant.—D.S.I.R., Gracefield.

3240. Voznesenskij, V. L.
The absorption of carbon dioxide by the roots of plants. [Russian, with English summary 8 lines.]
Fiziol. Rast., 1958, **5**: 329-36, bibl. 15.

$C^{14}O_2$ was used to show that plants, among them beans, can absorb CO_2 through their roots. The amount absorbed varied with the species and increased up to 15-fold when the leaves were illuminated. The total, however, was always less than 5% of the total CO_2 uptake by the plants.

3241. van der Veen, R.
Plant growth in coloured light.
Sci. Hort. 1957-58, 1958, **13**: 33-7, illus.

Ultra-violet light was always detrimental to plant growth, although most plants adapted themselves to a certain ultra-violet intensity by developing thicker, hairier leaves. In experiments with coloured light, tomato plants were shortest when grown in blue light, but elongated rapidly when a trace of infra-red was added to the blue. Plants grown in red light were of medium height, and greater intensities of infra-red were needed to increase their height. In a combination of red and blue light plants were as short as, or shorter than, plants grown in blue light alone. With *Mirabilis jalapa*, plants grown in blue light were also very short but those in red light were strongly elongated; the addition of infra-red to the blue increased length only slightly. With salvia, plants were short in red light and high intensities in infra-red were needed to increase elongation, whereas only a trace of infra-red was needed to increase growth in blue light. The tentative conclusion is drawn that one inhibiting substance is formed in blue light and another in red. The "blue" inhibitor is slowly but irreversibly destroyed by small amounts of infra-red, whereas the "red" inhibitor is reversibly inactivated by infra-red. In some plants (*Mirabilis*) the "blue" inhibitor is dominant, and in others (tomato) the "red" inhibitor is dominant.—Philips Res. Labs, Eindhoven, Netherlands.

3242. Voskresenskaja, N. P., and Grišina, G. S.
The long-term effect of the spectral composition of light on plants. [Russian, with English summary ⅓ p.]
Fiziol. Rast., 1958, **5**: 147-55, bibl. 30, illus.

Beans were grown in sand and soil cultures at different N levels under red and blue light. Compared with red, blue light enhanced the synthesis of nitrogenous organic substances, size of chloroplasts and content of chlorophyll. The differences were most apparent in N deficient plants. The carbohydrate content was negatively correlated with the accumulation of N and otherwise unaffected by light colour.

3243. Krylov, A. V., and others.
Gravity as a factor in the formation of organs in plants. [Russian.]
Fiziol. Rast., 1958, **5**: 368-71, bibl. 4, illus.

Black currant cuttings were rotated for 43 days in a specially constructed centrifuge in Knop solution with light and air provided. Subjecting the cuttings to the centrifugal force directed towards the basal end resulted in callus and root formation at this end and leaf and shoot formation at the apical end. The roots grew out from the base of the cuttings, mainly from the callus, and the growth of leaves and shoots was orientated towards the base and was more vigorous than that of normally rooted controls. When the centrifugal force was directed towards the apical end callus was formed on the basal end and roots on the apical end, i.e. a break occurred between callus and root formation. Leaf development was poor.

3244. Letham, D. S.
Cultivation of apple-fruit tissue *in vitro*.
Nature, 1958, **182**: 473-4, bibl. 10, illus.

Tissue from several varieties of apple fruits was successfully cultured *in vitro* both before and after cessation of cell division. Growth of new tissue was mainly from the cut surface of the vascular bundle on the centre of the explant.—D.S.I.R., Auckland, N.Z.

Growth substances.

(*See also* 3285j, m, 3286a, 3356, 3357, 3445, Weeds and weed control section, 3628, 3636, 3648, 3683, 3702, 3703, 3727, 3728, 3757-3759, 3816, 3818, 3923, 3953, 3974, 3980k 3986, 4007, 4135.)

3245. Gorter, C. J.
Abscission as a bio-assay for the determination of plant growth regulators.
Physiol. Plant., 1957, **10**: 858-68, bibl. 20, illus.

A [leaf] abscission test is described which is suitable for determining auxin activity. Calibration curves are reproduced for: IAA, NAA, MCPA, 2,3,5-TIBA, 2,3,5-TCIBA, 2,3,5-TBrBA, PYROA and 3,5-DPYROA. For special purposes this test is very suitable, but it requires large numbers of plants. The 2,3,5-halogen substituted benzoic acids act as auxins, the sequence of strongest activity being: TBrBA>TCIBA>TIBA. The 4-chloro and 2,4-dichloro series of the phenoxyalkylcarboxylic acids have alternative activity. This indicates β-oxidation in the side chains. A recently recognized new group of auxins, the 2-pyridoxyacetic acid and its 3,5-dichloro derivative, act as auxins in the abscission test also. [From author's summary.]—Lab. Tuinbouwpl., Wageningen.

3246. Crowe, A. D.
Methods for faster and more precise determinations of plant growth substances.
From abstr. in *Agric. Inst. Rev.*, 1958, **13** (3): 39.

Studies on the use of two-dimensional chromatography in the analysis of growth substances have shown that there are inherent limitations to the usefulness of the technique, chiefly owing to the fact that the location of the active compounds on the chromatogram usually cannot be made by a continuous type of identification. A method of two directional chromatography has been developed which allows location of the active areas by the non-continuous bioassay identification, yet retains the advantage of development with two solvents. This work made it highly desirable to develop a more rapid and accurate method for preparing the *Avena* mesocotyls used in the bioassay. A cutting device was constructed which, together with a few minor changes in procedure, resulted in a considerable reduction in the time necessary to carry out the standard *Avena* first internode test for auxins, plus some improvement in the sensitivity of the test.—N.S. Dep. Agric. Mktng, Kentville.

3247. Mudd, J. B., and Zalik, S.
The metabolism of indole by tomato-plant tissues and extracts.
Canad. J. Bot., 1958, **36**: 467-72, bibl. 16.

Tryptophan and indoleacetic acid were metabolites in indole metabolism. Preparations from Zn-deficient tomato plants metabolized indole more efficiently than those from normal plants. [From authors' abstract.]—Univ. Alberta, Edmonton.

3248. Michniewicz, M.
Wpływ syntetycznych substancji wzrostowych na zrastanie się szczepionych roślin zielnych różnej przynależności systematycznej. Częsc I. Szczepienia w rodzinie Solanaceae. **(The effect of synthetic growth substances on graft unions in herbaceous plants of different systematic groups. Part I. Grafts of Solanaceae.)** [English and Russian summaries.]
Acta agrobot., 1956, **4**: 87-120, bibl. 35, from *Ref. Ž.* (*Biol.*), 1957, No. 16, Abstr. 68,981.

The effect of IAA and its potassium salt, IBA and its methyl ester, the potassium salt of NAA and biotin on the graft union of tomato, pepper, nightshade and

Solanum citrullifolium was studied. Good results were obtained with all substances and in particular with IBA at 0·001–0·005%. Excessive callus growth, impeding union, did not occur. The most suitable method of application was soaking the scions for 2 hrs before grafting. The grafts were more successful where the scions were taken from plants in flower. The effect of growth substances was most marked when the union of the components under ordinary conditions was poor.

3249. Rakitin, Ju. V., and Zemskaja, V. A.
The effect of 2,4-D on the nitrogen metabolism of oat and bean plants. [Russian, with English summary ½ p.]
Fiziol. Rast., 1958, **5**: 97-106, bibl. 64.

Beans in the 2nd permanent leaf stage and oats in the 3-4 leaf stage were sprayed or infiltrated under vacuum with 0·1% 2,4-D. Beans showed a greater reduction in N uptake and larger change in protease activity towards hydrolysis than oats. The protein and non-protein N of the leaves and roots decreased and that of the stems increased in beans, while in oats changes were insignificant and transient.

3250. Harris, J. H.
Experiments with various chemicals to attenuate the toxicity of 2,4-dichlorophenoxyacetic acid.
Diss. Abstr., 1958, **18**: 17-18, being *Publ.* 25,058 of 144 pp.

In greenhouse tests expected 2,4-D toxicity symptoms on bean plants were reduced by applications of carbon, transcinnamic acid or riboflavin before that of 2,4-D. In field trials with vines carbon was the most effective in reducing 2,4-D injury. Carbon at 2% applied before application of 100 p.p.m. 2,4-D reduced symptoms of toxicity but was not effective in preventing injury by 1,000 p.p.m. 2,4-D. In studies on mode of action and diffusion rates of certain chemicals and 2,4-D within vine leaves, it was found that transcinnamic acid, riboflavin, DNP and MH were all able to counteract the effects of 2,4-D applied as long as 6 hours after the chemical. It is considered that carbon, 2,4-dinitro-o-cresol and transcinnamic acid may have possible uses in horticulture.—St. Coll. Wash.

3251. Wareing, P. F.
Interaction between indole-acetic acid and gibberellic acid in cambial activity.
Nature, 1958, **181**: 1744-5, bibl. 2, illus.

Experiments with 1-year-old, pot-grown sycamore seedlings showed that application in early March of gibberellic acid (0·5 or 1 mg. per g. of lanolin) to the tips of disbudded twigs stimulated cambial division, but the new tissue formed was practically non-vacuolated and unlignified. Externally applied IAA alone (0·1 or 0·5 mg. per g. of lanolin) induced the formation of a narrow band of new xylem with lignified vessels. Combined application of the two substances resulted in the development of a broad zone of new xylem with fully lignified vessels and fibres. Control shoots treated with pure lanolin produced no new wood. Detached shoots of poplar and ash responded in the same way as sycamore seedlings. Callus formation was stimulated by IAA, with or without gibberellic acid, but only slightly by the latter substance alone.—Univ. Manchester.

3252. Bourdeau, P. F.
Interaction of gibberellic acid and photoperiod on the vegetative growth of *Pinus elliottii*.
Nature, 1958, **182**: 118, bibl. 4.

The results presented here indicate that gibberellic acid (GA) promotes the growth of slash pine only under short-day conditions. It appears that in slash pine GA is able to break the type of bud dormancy induced by short-day treatment, and to stimulate the growth of elongating shoots exposed to short photoperiods. The lack of response to GA under long-day conditions suggests that the natural gibberellin factor becomes deficient, in this species, only under short days. Interactions between GA and photoperiod have also appeared in a preliminary study on bud-break in deciduous species.—Yale Univ., New Haven, Conn.

3253. Lincoln, R. G., and Hamner, K. C.
An effect of gibberellic acid on the flowering of xanthium, a short-day plant.
Plant Physiol., 1958, **33**: 101-4, bibl. 14.

The present experiments constitute evidence for an increase in the flowering response of xanthium as a result of treatment with GA_3. GA_3 did not alter the flowering response of intact xanthium plants. Debudded plants, with only mature leaves remaining, did not serve as a source of the flowering stimulus either with or without GA_3. GA_3 will cause a threefold increase in the flowering potential of debudded plants with young leaves. A similar increase was demonstrated in the flowering response of slow growing cotyledonary buds following application of GA_3. Immature tissue is considered to be the site of action for GA_3 in promoting the flowering of xanthium. It is suggested that GA_3 may act by promoting an increased capacity for the storage of the stimulus in the immature tissues. [Authors' summary.]—Long Beach St. Coll., Calif., and Univ. Calif., Los Angeles.

3254. Plack, A.
Effect of gibberellic acid on corolla size.
Nature, 1958, **182**: 610, bibl. 3.

Emasculation of *Glechoma hederacea* flower buds resulted in a reduction of corolla size similar to that found in naturally occurring female flowers, which suggests that the anthers produce a hormone causing enlargement of the corolla. When applied in aqueous solution to emasculated buds, gibberellic acid—but not other growth substances—restored the size of the corolla to that of intact flowers. The effect of emasculation and its reversal by gibberellic acid may be general phenomena, as the author obtained results from *Geranium anemonifolium* similar to those from *Glechoma*.—Univ. Coll. North Staffs.

3255. Nickell, L. G.
Production of gibberellin-like substances by plant tissue cultures.
Science, 1958, **128**: 88-9, bibl. 17.

Gibberellin-like activity, measured by the effect on dwarf pea plants, was shown by extracts from tissue cultures of various plant parts from both monocots and dicots. These preliminary results support the hypothesis that the gibberellins, or gibberellin-like substances, are universal in the plant kingdom and might play a vital rôle in the control of plant growth.—Chas. Pfizer & Co. Inc., Brooklyn, N.Y.

Nutrition.

(*See also* 4158.)

3256. PERKINS, H. J.
Chemistry of boron in plants.
Diss. Abstr., 1957, **17**: 2795-6, being *Publ.* 24,613 of 85 pp.

The presence of chlorogenic and caffeic acids in necrotic areas of B-deficient leaves has been demonstrated in tomato, lettuce and radish [see *H.A.*, 27: 404]. B-deficient leaves and stems of peach, apricot, prune, cherry, lettuce, radish and tomato contained higher contents of free amino-acids than healthy material.—Iowa St. Coll.

3257. ODHNOFF, C.
Boron deficiency and growth.
Physiol. Plant., 1957, **10**: 984-1000, bibl. 31, illus.

A convenient method of obtaining B-deficient plants in water culture is described, by which morphological symptoms of deficiency develop within 3 days. Beans were used as test plants. B-deficient plants contained higher N and P on a dry weight basis. No relationship between B and IAA was obtained in simple growth tests. B-deficient root tips showed an increase in peroxidase activity. Roots and leaves of B-deficient beans showed a significant increase in both reducing and non-reducing sugars. Analytical data on the time course of the changes in sugar level are given. A higher amount of cell wall material was found in those parts of the plant which showed B deficiency. When B was added discontinuously, the roots showed rings of laterals alternating with rings of dead lateral meristems. The results indicate that boric acid acts primarily on the stretching phase of cell elongation.—Bot. Lab., Lund.

3258. HUMPHRIES, E. C.
Effect of boron on production of adventitious roots.
A.R. Rothamsted exp. Stat. 1957, 1958, p. 84.

Some further experiments were done on the effect of applying boron, with or without carbohydrate, to the primary leaves of dwarf French beans (*Phaseolus vulgaris*) on the formation of adventitious roots by the hypocotyl [*H.A.*, 27: 3076]. They confirmed that sucrose applied in the light, but not in the dark, depressed root formation, but fructose and glucose in the same concentration had no effect. An organic boron compound (phenylboronic acid) was as effective in producing roots as sodium borate in solutions supplying equivalent boron. As reported previously, no interaction was found between boron and sucrose, so there is no evidence that boron accelerated sucrose transfer to the hypocotyl. [Author's report.]

3259. DANIEL, L., AND VÁRÓCZY, E.
Pollenélettani vizsgálatok II. A bór hatása a pollen csírázására és a pollentömlők növekedésére. **(Physiological studies on pollen. II. The effect of boron on the germination of pollen grains and growth of pollen tubes.)** [English and Russian summaries ½ p. each.]
Növénytermelés, 1957, **6**: 309-30, bibl. 56.

In a study on the pollen of 56 species of fruit, vegetable, ornamental and wild plants boric acid was found necessary for germination in several species. In tests on the pollen of *Impatiens holstii* the maximum effect of B occurred at pH 5·5, when, however, a high percentage of pollen and pollen tubes burst. At pH 6·5 and 7·1 B aided germination but not tube elongation.

3260. YAMAGATA, N., AND MURAKAMI, Y.
A cobalt-accumulator plant, *Clethra barbinervis* Sieb. et Zucc.
Nature, 1958, **181**: 1808-9.

Leaves of *Clethra barbinervis* were found to contain more than 100 times as much cobalt as those of 16 other tree species analysed. Although there is no evidence that Co is essential for higher plants, the large accumulation of Co in leaves of *Clethra* suggests that this element may have some function in them. Further work is in progress.—Gunma Univ., Kiriu, and Univ. Tokyo.

3261. WARINGTON, K.
Chelated iron complexes as sources of iron in solution culture.
A.R. Rothamsted exp. Stat. 1957, 1958, pp. 83-4.

Development of Fe-deficiency symptoms in peas was prevented by adding to the nutrient solution either 0·125 p.p.m. of Fe in the form CHEL 138 (ethylenediamine NN′bis (hydroxyphenyl acetic acid)), or 0·25 p.p.m. of Fe as one of the 3 chelated compounds with NaEDTA, HEEDTA or DTPA. In another series of tests, CHEL 138 was equally effective at pH 5·5 or 7·5, but the other 3 chelates showed reduced activity in the alkaline medium. Translocation of Fe from root to shoot was increased by CHEL 138 and to a lesser extent by DTPA. [For earlier work see *H.A.*, 27: 3490.]

3262. POSSINGHAM, J. V., AND BROWN, R.
The nuclear incorporation of iron and its significance in growth.
J. exp. Bot., 1958, **9**: 277-84, bibl. 10, illus.

Fe^{59} was incorporated into the nuclei in pea roots to a much higher concentration than in the surrounding cytoplasm.

3263. LAGERWERFF, J. V.
Comparable effects of adsorbed and dissolved cations on plant growth.
Soil Sci., 1958, **86**: 63-9, bibl. 27.

Bean seedlings were grown in a glass bead medium with 2 types of culture, viz. solution and solution plus cation exchange resin. The composition of the solution phase of each type of culture was identical for each treatment. In the first series of experiments the solutions contained Na^+ and Ca^{++} as the only cations; 3 sodium-adsorption ratios were established at 2 electrolyte levels, and the treatment period lasted 10 days. In the second series a complete nutrient solution was used to which Na^+ and Ca^{++} were added so that 3 sodium-adsorption ratios were established at constant electrolyte level; treatment could be extended to 3 weeks. As the sodium-adsorption ratio of the solution increased, growth and Ca uptake decreased, and Na uptake decreased, but no difference in plant response or composition related to the presence or absence of adsorbed Na or Ca was observed. These results indicate that under conditions of equilibrium the composition of the solution phase of the growth medium fully characterizes the environment of the plant roots, the adsorbed cations having no direct effect.—U.S.D.A., Riverside, Calif.

3264. TAKAMI, —.
Calcium oxalate crystals in *Dioscorea japonica* and *Begonia evansiana*. [Japanese, with English summary.]
Bot. Mag., 1956, **69** (815): 243-7, from *Ref. Ž.* (*Biol.*), 1957, No. 16, Abstr. 68,949.

In the leaves of *D. japonica* calcium oxalate crystals were concentrated near the veins and in the epidermis and less so in the mesophyll. In plants adequately provided with nutrients the number of crystals decreased, while their size increased. S, N and Mg deficiencies altered the shape of the crystals and reduced their size; K deficiency affected the crystals only in *B. evansiana*. In *B. evansiana* growing in a medium containing ammonium-N raphides were found.

3265. TOMBESI, L., AND CALÈ, M. T.
Contributo allo studio di alcune attività enzimatiche dei tessuti fogliari in rapporto al contenuto in elementi assimilabili del suolo. Nota I. **(Contribution to the study of some enzyme activities of leaf tissues in relation to amounts of assimilable elements in the soil. Part I.)** [English summary $\frac{1}{4}$ p.]
Ann. Sper. agrar., 1958, **12**: 427-57, bibl. 5, illus.

Catalase activity in turnip leaves rose sharply as soil N was increased from the initial value of 21·46 kg. per ha. by applications of 40 and 80 kg. per ha., and continued to increase more gradually with a further 40 kg. increment. When soil P_2O_5 was increased from 24·24 to 74·24 kg. per ha. the catalase activity rose, but there was no further rise from heavier applications. It increased in response to 100 kg. per ha. of K_2O added to soil already containing 40·77 kg. per ha., but decreased when the application was doubled.

3266. RAHTEENKO, I. N.
Transfer of mineral nutrients from one plant to another resulting from the interaction of their root systems. [Russian.]
Bot. Žurnal, 1958, **43**: 695-701, bibl. 20.

Radioactive P applied to leaves of many woody plants was transferred through the roots into other plants of both the same and other species. At the botanic garden of the White Russian Academy of Sciences leaves of a 7-year-old *Malus domestica* growing at a distance of 1·7 m. from a treated 7-year-old *Quercus robur* were found to be radioactive.

Atomic energy and radioactive isotopes.

(*See also* 3286d, e, 3753, 4013, 4129, 4149, 4166.)

3267. LANDBOUWKUNDIG TIJDSCHRIFT.
De toepassing van de atoomkernenergie in de landbouw. **(The use of atomic energy in agriculture.)**
Landbouwk. Tijdschr., 1958, **70**: 245-376, bibls., illus.

The collected papers read at a symposium include those on the use of radiation for food preservation, mutation induction, plant physiological studies, and insecticide studies.

3268. KUZIN, A. M.
The utilization of ionizing radiation in agriculture. [Translated from Russian.]
Proc. int. Conf. peaceful Uses atom. En. 1955, 1956, **12**: 149-56, bibl. 37, illus. [Received 1958.]

Root growth of radish and pea seedlings was stimulated by X-ray treatment of the dry seed before sowing at a dosage of 500r. At 1,000r. any initial stimulation had almost entirely subsided by the 5th day of germination, and 2,000r. had a retarding effect, more marked in pea than in radish. In cucumber there was no distinct effect of pre-sowing treatment on early root growth, but an optimal dose of 300r. stimulated the growth of the first foliage leaf. In another experiment, pretreatment of radish seed at 1,000r. led to advanced maturity and increased size, yield and quality of the harvested roots. Cabbage responded to pre-sowing irradiation at 1,000 or 2,000r. with a 19% increase in yield and earlier maturity. Pea seed of a split-pea variety gave seed yield increases of 10% and 21% after treatment with 350 and 500r. respectively, but higher dosages reduced yield. The weights of 1,000 pods and 1,000 seeds were significantly increased by 350r. A preliminary comparative study showed that long exposure of seeds to small doses of γ-rays from Co^{60} was equivalent to short exposure to large doses of X-rays. Treatment of pea and bean seeds for 24 hours with uranium fission products of 0·5 mc./l. activity resulted in 2–5 days' advancement of flowering and substantial increases in seed yield. The activity of the harvested products was less than 10^{-9} c. per kg. Fruit yields of water-cultured tomatoes were increased by 38% when P^{32} was used at $2 \cdot 3 \times 10^{-5}$ c./l. in the nutrient solution and by 25% when the rate was raised to $5 \cdot 3 \times 10^{-5}$ c./l. Seed yield was increased in peas by addition of radium or uranium salts at 10^{-10} and 10^{-5} c. per kg. to the medium, and nodulation of pea roots was increased to more than 5 times the normal by P^{32} at $8 \cdot 3 \times 10^{-5}$ in water- and sand-cultures. Smaller increases were given by lower concentrations.

3269. TUKEY, H. B., AND OTHERS.
Utilization of radioactive isotopes in resolving the effectiveness of foliar absorption of plant nutrients.
Proc. int. Conf. peaceful Uses atom. En. 1955, 1956, **12**: 138-43, bibl. 11, illus. [Received 1958.]

The results reviewed concern:—the entry of nutrients from soaked gauze into dormant branches of apple and peach through the bark; the uptake and movement of mineral nutrients applied to the foliage of apple, runner bean, tomato/tobacco reciprocal grafts, tomato and strawberry; factors affecting foliar absorption of P by runner beans; plant tolerance of foliar applications of C^{14} urea; leaching of nutrients from leaves of bean and poinsettia.

3270. KURSANOV, A. L.
Analysis of the movement of substances in plants by means of radioactive isotopes. [Translated from Russian.]
Proc. int. Conf. peaceful Uses atom. En. 1955, 1956, **12**: 165-9, bibl. 20, illus. [Received 1958.]

Pumpkin plants were supplied through one leaf with

$C^{14}O_2$ and the movement of the assimilates from this leaf to other organs was followed by autoradiography. The main stream was from the leaves to the roots and thence upwards to growing shoots and fruits, but there was also direct migration from the experimental leaf to shoot tips and fruits, and into other leaves. Translocation rates varied from 72 cm. per hour in young plants to 50 cm. downwards and 30 cm. upwards in older plants. The rate of translocation to the fertilized ovary was 12 cm. per hour in the first few days and 36 cm. per hour on the 10th day; it continued to increase and other adjacent leaves gradually joined the subtending leaf in supplying the developing fruit, and the sap conveyed decreasing quantities of amino acids and increasing amounts of sugar.

3271. SCULLY, N. J., AND OTHERS.
Biosynthesis in C^{14}-labeled plants; their use in agricultural and biological research.
Proc. int. Conf. peaceful Uses atom. En. 1955, 1956, **12**: 377-85, bibl. 7, illus. [Received 1958.]

A complete biosynthesis chamber unit for growing plants in a $C^{14}O_2$-treated atmosphere is illustrated and described. Detailed accounts are given of the sand culturing of tobacco plants in such a chamber for the study of flavonoids and polyhydroxyphenolic compounds. The fixing and storage of plant tissue and the isolation and identification of flavonoids are also described. Briefer accounts include studies of sucrose synthesis in canna leaves and the toxic effects of C^{14} manifested in onion plants grown from sets derived from treated plants, and in kidney bean progeny of treated plants. The symptoms in kidney beans included N deficiency and increase in ascorbic acid content. The technique is briefly described for studying formation and translocation of carbohydrates and their conversion into latex in *Hevea brasiliensis*.

3272. HOLM-HANSEN, O., AND OTHERS.
The effect of radiocarbon on the rate of carbon dioxide utilization during photosynthesis.
Biochim. biophys. Acta, 1958, **28**: 587-91, bibl. 16, illus.

In view of the wide application of radioactive carbon dioxide in tracer experiments together with a reported anomalous effect of the isotope content on the tracer behavior, we have investigated the effect of varying specific activity of the carbon dioxide on both the rate and pattern of photosynthetic carbon fixation. We have found no effect of the carbon-14 other than the ordinary mass effect in both algae [*Chlorella*] and higher plants [primroses]. [Authors' summary.]—Univ. Calif., Berkeley.

3273. GAR, K. A., AND KIPIANI, R. Y.
Research by means of radioactive isotopes concerning penetration and residues of phospho-organic insecticides in plants. [Translated from Russian.]
Proc. int. Conf. peaceful Uses atom. En. 1955, 1956, **12**: 185-99, bibl. 17, illus. [Received 1958.]

Cabbage, haricot bean, chrysanthemum, hydrangea, vine, cherry, apple, raspberry, currant, tomato, cucumber, lemon, trifoliate orange and tea plants were used to study penetration and hydrolysis of some systemic insecticides (thiophosphate compounds). Results are recorded in detail for each kind of test plant, the bulk of the work involving diethyl-4-nitrophenylthiophosphate. This compound was too readily decomposed in plants, particularly in sunlight, to give effective control of aphids, and in general it lowered the plant's vitality.

Glass and plastic houses.

(*See also* 3285f, h, k, u, 3630, 3662, 3910, 4177, 4179.)

3274. MORRIS, L. G., AND OTHERS.
The limitation of maximum temperature in a glasshouse by the use of a water film on the roof. [French, German and Spanish summaries 13 lines each.]
J. agric. Engng Res., 1958, **3**: 121-30, bibl. 10, illus.

The effect on inside air temperature of a water film on the glass may be summarized as follows. It is not practicable to maintain on the glass a water film thick enough to absorb a significant amount of solar radiation. Nevertheless, a reduction of inside air temperature can result from the use of a water film owing to the heat conduction through the glass. This effect is greater, the lower the water film temperature, and is virtually independent of the thickness of the film. Since the heat loss is by conduction it is important to wet the whole area of glass. Even so, the use of a water film does not compare favourably with the use of forced ventilation in conjunction with a water spray or damp pad for pre-cooling the incoming air. In hotter, drier climates, use of water film compares even less favourably with the use of pre-cooled air. [Authors' conclusions.]

3275. SPOELSTRA, P. A.
Afstandsleidingen. (**Long distance [heat] piping.**) [English summary 16 lines.]
Meded. Dir. Tuinb., 1958, **21**: 336-40, illus.

The use and requirements of long-distance piping for glasshouse heating are discussed. Four methods of laying the pipes are described, and capital costs are compared. Graphs show the most economic pipe diameters and insulation thicknesses.

3276. MORRIS, L. G.
Current research on the use of plastic films in horticulture.
Sci. Hort., 1957-58, 1958, **13**: 49-55, bibl. 1.

Experiments at Wrest Park showed that polythene gives less frost protection than glass, and may even cause lower temperatures than in the open by reducing heat gains from the surrounding air. Poly vinyl chloride was intermediate in effect between glass and polythene. In experiments at Stockbridge House temperatures under polythene were 0–8° F. lower than those under P.V.C. as a result of greater radiation losses. At Wrest Park lining a glasshouse with polythene film reduced heat loss to 62% of the loss through glass alone, and reduced incoming solar energy by only 4–15%. The reduction of solar energy was least when the total intensity was smallest.

3277. Bruun, K.
Muovikatteinen blokkihuone. **(A plastic covered blockhouse.)** [English summary 20 lines, cyclostyled.]
Puutarha, 1958, **61**: 184-5, illus.

Upright poles are placed 4–5 m. apart. Plastic sheets are drawn across the ridge-poles and held in place by loading with planks, which are fastened with springs, compensating for expansion and contraction of the sheeting with temperature changes. The sheets are not welded, but overlapped 25 cm., allowing for ventilation by insertion of wedges. If the house is constructed on a slope, rain can run along the planks and will not stay on the sheets. Polythene 0·09 mm. thick lasts a year and can be tied back in bunches during the winter.

Machinery and special devices.

(*See also* 3285c, i, x, 3682, 3996b, 4173, 4186.)

3278. Zolotov, A. N.
A 4-row planting machine. [Russian.]
Sad i Ogorod, 1958, No. 5, pp. 51-3, illus.

An illustrated description is given of a tractor-drawn planting machine for use in the fruit nursery. With the 4 planting units in action it can plant up 2 ha. a day at 30,000 plants per ha.

3279. Anon.
Fumigatore del terreno di pratica realizzazione. **(A soil fumigator of practical design.)**
Inf. fitopat., 1958, **8**: 141, illus.

A bar 1·5 m. long bears 7 blades, behind each of which a plastic tube, controlled by its own tap, discharges the fumigant. The drills are covered by the action of a chain and a roller. The frame, built onto the bar, bears 2 wheels and supports a 50 l. tank.

3280. Weleczka, J.
Die Anlage von elektrischen Maschendrahtheizungen. **(The installation of electric heating by mesh wire.)**
Rhein. Mschr. Obstb., 1958, **46**: 55-6, from abstract in *InformDienst Weihenstephan*, 1958, No. 4, p. 70.

The method is useful for propagation and small areas in general. In the open about 40 watts per sq. m. are required to maintain a soil temperature of 20–22° C., and in the greenhouse about 70 watts for a soil temperature of 28–30° C. [See *H.A.*, 28: 726.]

3281. Anon.
L'emploi du polyéthylène en remplacement des godets en terre cuite. **(The use of polyethylene instead of earthenware pots.)**
Rev. hort. Algér., 1958, **62**: 318-29, illus.

Instructions are given for the construction and use of plastic pots, 6 × 6 × 10 cm., supported in groups of 112 in metal baskets, for nursery work.

3282. Lockwood, J. L., and Ballard, J. C.
Soil temperature tanks with polyethylene film liners.
Plant Dis. Reptr, 1958, **42**: 814-16, bibl. 4, illus.

For use in studies on the effects of temperature on root diseases or in evaluating seedling resistance to root diseases.—Mich. agric. Exp. Stat., E. Lansing.

3283. Dore, W. G.
A simple chemical light-meter.
Ecology, 1958, **39**: 151-2, illus.

On exposure to sunlight, anthracene in benzene solution polymerizes into insoluble dianthracene. The light-meter described is operated by exposing glass tubes of saturated anthracene solution and, afterwards, estimating the amount of unconverted anthracene by measuring aliquots of the filtered solution in a Bausch and Lomb "Spectronic 20" colorimeter set at a wavelength of 350 mμ.—Canada Dep. Agric., Ottawa.

3284. Peynado, A.
Devices for observing root growth and calipering tree trunks.
J. Rio Grande Valley hort. Soc., 1958, **12**: 61-6, bibl. 3, illus.

This paper describes and illustrates 2 devices: (1) A modified version of the root observation box designed by F. J. Crider (*Citrus Leaves*, 1927, **7** (3): 27-30), which is waterproof and possesses one or two glass observation windows; and (2) a light-weight caliper, made of aluminium conduit pipe, with a handle 5½ ft long and with a scale on the end of the handle, which makes it possible to measure trunk diameters from outside the skirts of the trees. The results are also recorded of observations on the root growth of sour orange stocks worked with grapefruit during the 5-month period Sept.-Jan. Some root growth occurred throughout the autumn and winter, but there was a distinct peak of activity in late Oct. and early Nov.—U.S. Dep. Agric. and Tex. agric. Exp. Stat., Weslaco.

Noted.

3285.

a Allan, J. E.
Atomic-absorption spectrophotometry with special reference to the determination of magnesium.
Analyst, 1958, **83**: 466-71, bibl. 5, illus.

b Alston, R. E.
Leuco-anthocyanin synthesis in dark-grown seedlings of *Impatiens balsamina*.
Amer. J. Bot., 1958, **45**: 289-94, bibl. 26.

c Casini, E.
Le materie plastiche nell'ortoflorofrutticoltura. **(Plastic materials in horticulture.)**
Riv. Ortoflorofruttic. ital., 1958, **42**: 80-98, 155-74, bibl. 78, illus.

d Cavazza, L.
Cenni sulla sperimentazione in pieno campo. **(Notes on field experiment technique.)**
Not. Mal. Piante, 1957, No. 42, pp. 150-72.
Layout schemes for herbaceous and tree crops.

e Clark, B. E., and Kirk, E. W.
The quality and labeling of seeds in New York as revealed by sampling and testing in 1957.
Bull. N.Y. St. agric. Exp. Stat. **781**, 1958, pp. 66, illus.
Including vegetable, flower and lawn seeds. [For an earlier report see *H.A.*, 28: 38.]

f Darby, L. A., and Gilbert, N.
The Trojan square. [Dutch summary 4 lines.]
Euphytica, 1958, **7**: 183-8, bibl. 4.
An experimental design, of particular value for variety trials in glasshouses.

g Ferguson, J. H. A.
Empirical estimation of thermoreaction curves for the rate of development [of a plant]. [Dutch summary 5 lines.]
Euphytica, 1958, **7**: 140-6, bibl. 4.
Based on phenological data.—Inst. hort. Plant Breeding, Wageningen.

h Fischer, F. J.
Ein rollbares Gewächshaus für den Gemüsebau. (**A movable greenhouse for vegetable growing.**)
Rhein. Mschr. Obstb., 1958, **46**: 56-7, from abstract in *InformDienst Weihenstephan*, 1958, No. 4, p. 69.
A hot frame rather than a glasshouse; the frame remains and the glass roof is moved.

i Germing, G. H.
Kunststoffolie in de tuinbouw. (**Plastic film in horticulture.**) [English summary 18 lines.]
Meded. Dir. Tuinb., 1958, **21**: 254-65, bibl. 16, illus.
A review of its uses in the Netherlands and abroad.

j Glasziou, K. T., and Inglis, S. D.
The effect of auxins on the binding of pectin methylesterase to cell walls.
Aust. J. biol. Sci., 1958, **2**: 127-41, bibl. 12.
Tests with 2,4-D on extracts of cell wall preparations from artichoke tubers and tobacco pith. [See also *H.A.*, 28: 1081i and 1602h.]

k Hiller, F.
Der Wärmehaushalt des Gewächshauses. (**Temperature relations in glasshouses.**)
Gartenwelt, 1958, **58**: 185-7, bibl. 1.

l Jeffrey, A. G.
Records and accounts for farm management.
Bull. Minist. Agric. Lond. **176,** 1958, pp. 75, H.M.S.O., 4s. 6d.
How to prepare and how to interpret farm accounts.

m Kavanagh, F., and Kuzel, N. R.
Fluorometric determination of gibberellic and gibberellenic acids in fermentation products, commercial formulations, and purified materials.
J. agric. Food Chem., 1958, **6**: 459-63, bibl. 6.

n Kolpikov, D. I., and Teterin, P. P.
A study of the rate of water exchange under field conditions with the aid of weights and a moisture meter. [Russian.]
Fiziol. Rast., 1958, **5**: 205-8, bibl. 11, illus.
Transpiration and water content of plants.

o Krober, O. A., and Howell, R. W.
Determination of sulfur in plant materials.
J. agric. Food Chem., 1958, **6**: 591-2, bibl. 4.
A rapid routine modification of turbidimetric determination.

p Lazar, V. A., and Beeson, K. C.
The determination of copper and molybdenum in plants by X-ray spectrography.
J. Ass. off. agric. Chem. Wash., 1958, **41**: 416-19, bibl. 4.
Satisfactory for Mo in both dried and ashed plant material, but for Cu only in ashed material.

q Lazzaro, O.
Imballaggi di cartone ondulato per gli ortofrutticoli. (**Packages of corrugated cardboard for fruit and vegetables.**)
Frutticoltura, 1958, **20**: 264-6, illus.
Advantages over wooden crates, particularly for pome and citrus fruits.

r Lisicyn, D. I.
The rôle of sucrose in the leaves of "glucoside plants". [Russian, with English summary 8 lines.]
Biohimija, 1958, **23**: 395-400, bibl. 25.
Lilac and ash infiltrated with sucrose.

s Loewus, F. A., and Stafford, H. A.
Observations on the incorporation of C^{14} into tartaric acid and the labeling pattern of D-glucose from an excised grape leaf administered L-ascorbic acid-6-C^{14}.
Plant Physiol., 1958, **33**: 155-6, bibl. 13.

t Lopez Gonzalez, J. de D.
Modes of entry of strontium into plant roots.
Science, 1958, **128**: 90-1, bibl. 3, illus.

u Ministry of Agriculture, London.
Glasshouse heating systems.
Leafl. hort. Mach., Minist. Agric. Lond. **1,** 1958, pp. 8, illus. 6d.
Their advantages and disadvantages.

v Novasio, D.
Gli autotrasporti di ortofrutticoli sollecitano una normazione del traffico. (**Road transport of fruit and vegetables requires organization.**)
Frutticoltura, 1958, **20**: 247-50, illus.
Refrigerated lorries and trailers are compared, with reference to export of Italian produce to other European countries.

w Počinok, H. N.
An apparatus for the determination of photosynthesis under field conditions based on the measurement of gas volume. [Russian.]
Fiziol. Rast., 1958, **5**: 200-5, bibl. 4, illus.

x Polster, H., and Reichenbach, H.
Bestimmung von Blattflächen in situ durch lineare Messungen. (**Estimation of leaf surface area *in situ* by linear measurements.**)
Biol. Zbl., 1958, **77**: 265-77, bibl. 17, illus.

y Ratvik, H., and Narvestad, K.
Arbeidskostnadene i søkelyset. **(Labour cost spot-lighted.)**
Gartneryrket, 1958, **48**: 383-5, 407-12, 429-32.
Horticultural labour problems discussed by the Institute of Management and agricultural Economy, Vollebekk.

z Simon, E. W.
The effect of digitonin on the cytochrome *c* oxidase activity of plant mitochondria.
Biochem. J., 1958, **69**: 67-74, bibl. 27.
Studies on mitochondria from bean and castor seedlings, roots and leaves of several vegetables, and from fruits and mushrooms.

3286.

a Simpson, G. M.
A colorimetric test for gibberellic acid and evidence from a dwarf pea assay for the occurrence of a gibberellin-like substance in wheat seedlings.
Nature, 1958, **182**: 528-9, bibl. 2.

b Sivadjian, J.
La transpiration bifaciale des feuilles à structure dorsiventrale. Études hygrophotographiques. **(The transpiration on both sides of dorsiventral leaves. Hygrophotographic studies.)** [Spanish summary 9 lines.]
Phyton, 1958, **10**: 123-8, bibl. 6, illus.
Test plants Jerusalem artichoke and several ornamentals.

c Sokolova, V. E., and Savel'eva, O. N.
Some characteristics of plant dehydrases. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **120**: 1084-7, bibl. 6.
Effects of temperature and certain inhibitors on dehydrases in bean seed, and of temperature on dehydrases in apple fruit.

d Tukey, H. B.
Die Anwendung radioaktiver Isotopen für die Bestimmung von Aufnahme, Transport und Auswaschung der Nährstoffe in oberirdischen Pflanzenteilen. **(The use of radioactive isotopes for the determination of nutrient absorption, translocation and leaching in aerial plant parts.)**
Gartenbauwiss., 1958, **23**: 102-12, bibl. 7, illus.

e Wittwer, S. H.
Nutrient uptake with special reference to foliar absorption.
Reprinted from *Atomic Energy and Agriculture*, Amer. Ass. Advancement Sci., [undated], pp. 139-64, bibl. 92, illus.
A review of work with radioisotopes. [See also *H.A.*, 28: 2121.]

f Yamamoto, Y., and Tomita, Y.
Studies on the bio-pigments and vitamins. III. The application of paper chromatography to the separation and determination of carotenoid pigments.
Mem. Fac. Agric. Kagoshima Univ., 1957, **3**: 16-24, bibl. 8, illus.
From tomato, *Citrus grandis*, carrot and spinach.

g Yuan, T. L., and Fiskell, J. G. A.
Dithizone and zincon procedures for zinc in plants: separation of interfering elements by ion exchange resins.
J. Ass. off. agric. Chem. Wash., 1958, **41**: 424-8, bibl. 9.
With results obtained in the analysis of various leaves and fruits.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 3228, 3278, 3285d, 3400d, n, p, x, 3401a, k, 4167, 4174, 4175, 4184, 4185, 4190, 4191, 4195, 4200m.)

3287. Dodge, J. C., and Snyder, J. C.
Horticulture. Tree fruits.
Wash. St. Res. Progr., 1958, No. 9, pp. 6-7.

Reports are given on variety breeding and evaluation; they also include the following results: Fruit cracking of sweet cherries may be reduced by a lime spray, and gibberellic acid has also shown promise. Williams' pears ripened more rapidly at 65° F. than at 75° F. or 55° F. after 1 month of cold storage; pears ripened at 55° F. were most susceptible to breakdown. In bulk bins bruise damage to peaches was no higher than in conventional picking lugs.

3288. Neumann, D.
Wuchs- und Ertragserhebungen im Obstbau. **(A growth and yield census in fruit growing.)** [Russian and English summaries 11 and 9 lines respectively.]
Arch. Gartenb., 1958, **6**: 3-11, bibl. 4.

Suggestions are made for standardizing enquiries into the performance of fruit trees and for selecting representative samples.—Univ. Rostock.

3289. Neumann, D.
Beiträge zur Statistik der Wuchs- und Ertragsleistung von Obstbäumen. **(Contributions to the statistics of the growth and yield performance of fruit trees.)** [Russian and English summaries 10 lines each.]
Arch. Gartenb., 1958, **6**: 23-87, bibl. 56.

In the years 1952-1955 more than 7,000 productive apple trees on different sites were measured as to yield, trunk circumference, crown outline and crown volume. A statistical analysis of this material was made with a view to solving the following problems:—(1) Relationship between growth increment and productivity in a series of variety-stock-combinations. (2) Determination of plot sizes and the numbers of replications in fruit growing trials with special reference to soil and tree variation. (3) Variability and correlation of growth increment and productivity of apple trees of the same variety and stock. (4) Possible reduction of the experimental error in fruit growing trials. [From author's summary.]—Inst. Gartenb. Marquardt b. Potsdam, and Univ. Rostock.

3290. HOLLAND, D. A., AND GREENHAM, D. W. P.
The minimization of variability in experiments on apples planted on the site of a previous orchard. I. The effect of cultural treatments associated with three years' arable cropping.
J. hort. Sci., 1958, **33**: 153-70, bibl. 7, illus.

Following the grubbing of a mature orchard of Bramley's Seedling apples an investigation was made into the effectiveness of deep (18 in.) or shallow (9 in.) ploughing immediately after grubbing, and of a rich or poor manurial programme during the ensuing 3-year period of arable cropping, on the restoration of uniformity of the soil and its suitability for further experimentation on apples. The effects of these treatments were assessed through a study of the variation of the arable crops and particularly of an apple indicator crop planted at the end of the 3-year period of arable cropping. Although a residual pattern directly related to the old tree positions was shown in the mangold crop, this type of pattern was not apparent in the apple indicator trees. Such patterns as were shown by the apples were mostly related to the paths of movement of tractors and implements and the distribution of fertilizers in the old orchard, and it is therefore concluded that the residual patterns were largely the result of past cultural treatments rather than of the siting of the trees themselves. The contribution of the residual patterns to the total variability of the apple indicator crop was negligible (after the first year) compared with the random component of variability. The effectiveness of cultural treatments in reducing the variability of subsequent trials is thus largely dependent, not on the persistence of a residual pattern, but on the reduction in random variability. Deep ploughing was more effective than shallow ploughing in reducing the variability in size of the indicator trees, this effect being independent of the manurial programme employed. [Authors' summary.] —E. Malling Res. Stat.

3291. KOVALEV, N. V., AND MIRZAEV, M. M.
Orchards in the "hungry" steppe. [Russian.]
Soc. S.H. Uzbekistana, 1956, No. 11, pp. 52-7, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 78,248.

The development of fruit growing in the "hungry" steppe is limited not only by soil salinity but also by a high water table. On uncultivated lands the water table is at a depth of 6–15 m., while after 7 years' cultivation it rose to 3·0–1·5 m. The water table was found to rise higher on small than on large plots. Hence it is recommended that on the "hungry" steppe very large orchards should be planted, ample mineral fertilizers used and lucerne grown as green manure. The best crops are probably apple, pear and vine; somewhat less satisfactory are plum and sweet and sour cherry, while apricot is considered unsuitable.

3292. ČISTJAKOV, V. N.
The prostrate orchards of Siberia. [Russian.]
Priroda, 1958, **47** (4): 105-7, bibl. 1, illus.

Conditions up to 30–50 cm. above the soil surface are stated to be much more favourable for plant growth than at greater heights (the air temperature being 4–5° C. higher than at 1·5–2 m.), and during the winter the trees are completely covered by snow. Apple is the principal crop; at Omsk, some 100 varieties have been grown in prostrate form for 27 years. Those showing the best results are listed.

3293. CASELLA, D.
L'albicocco nell'indirizzo tecnico e nelle prospettive di sviluppo. (**Apricots: technical aspects and developmental prospects.**)
Ital. agric., 1958, **95**: 293-307, bibl. 2, illus.

Many apricot varieties ripen 10–15 days earlier than their normal date if grafted on vigorous peach stock such as Terzarola, or on sweet almond with an interstock of vigorous peach or Cerasiello, Meraviglia tonda or Luizet apricots. Ripening is slightly advanced by damson and some plum rootstocks. Optimal sites are coastal, with shelter from wind, a S.E. aspect and deep soil. Early fruit thinning is necessary in years of high fruit set. Fruit quality is improved and ripening advanced by applying adequate P and K and lime, and avoiding excess of N. Notes are given on apricot varieties suitable for dessert, canning and drying, and early ripening varieties are listed. Other subjects discussed are production figures, harvesting, grading, packing and export. Recommendations are made for extending and improving apricot growing in Italy.

Varieties and breeding.

(*See also* 3400b, g, i, j, q, s, z, 3401e, h, 3402, 4181.)

3294. LEONT'EVA, M. N.
National variety trials on top- and small-fruits and vine. [Russian.]
Sad i Ogorod, 1958, No. 6, pp. 43-6.

National variety trials exist in the R.S.F.S.R., Ukrainian S.S.R. and Moldavian S.S.R. and are to be started in 1958 in 12 other republics. The trials are situated in well-established collective or state farms in areas of commercial fruit or vine growing or where the development of these industries shows promise. The function and task of the trials is outlined.

3295. MAURER, K. J.
Ein Beitrag zur Obstsorten-Konstitutionsforschung als moderne Sortenkunde. (**Research into the constitution of fruit varieties as a basis of variety descriptions.**) [English, French and Spanish summaries 8, 13 and 12 lines respectively.]
Mitt. Klosterneuburg, *Ser. B*, 1958, **8**: 137-60, bibl. in text.

The author emphasizes that varietal descriptions alone give insufficient data for economic fruit growing. Information on varietal behaviour as affected by environmental conditions (including rootstock) is all-important. The author illustrates the relationship between genetical and environmental factors with many examples, chiefly of apples, but since isolated facts cannot be a satisfactory basis for generalizations, he seeks the co-operation of all fruitgrowing countries in helping to solve these problems. [See also *H.A.*, 23: 142.]

3296. Wood, C. A.
Apples at Mylnefield.
Reprinted (with minor amendments) from *J. roy. Caled. hort. Soc.*, 1957, pp. 11, bibl. 3, illus.

The 3 main apple trials at this Scottish station are described, namely a variety collection (including some old varieties) on M.IX, an elimination trial of modern varieties on 4 Malling stocks, and a trial on the behaviour of the main commercial rootstocks. No recommendations have yet been based on results obtained.

3297. Baudewijn, J.
La fabrication des compotes de pommes. Essai comparatif de la valeur de quelques variétés. **(Making apple compote. Comparative trial of the suitability of certain varieties.)**
Rev. Agric. Brux., 1958, **11**: 567-74.

Flavour, colour, texture and cooking time were assessed for 13 varieties. The final order of merit depended on whether 10% or 20% of sugar was added. In both cases Cox's Orange was rated highest, Reinette Grise next, and Keuleman lowest.

3298. Overcash, J. P., Murphy, B. C., and Ashley, T. E.
Research shows best pears for South Mississippi.
Miss. Fm Res., 1958, **21** (1): 1, 5, illus.

Varieties with short winter-chilling requirements are Baldwin, Campas, Carrick, Dabney, Douglas, Garber, Hood, Kieffer, Le Conte, Orient, Pineapple (sand), and Wilder.

3299. Overcash, J. P., and Campbell, J. A.
South Mississippi peach varieties.
Miss. Fm Res., 1957, **20** (12): 7, illus.

Recommended commercial varieties with short winter-chilling requirements are Maygold, Burbank July Elberta, Sunhigh, Southland and Hiley.

3300. Fogle, H. W., and others.
Freestone peach varieties for the Pacific Northwest.
Bull. Wash. St. agric. Exp. Stats **576**, 1957, pp. 24, bibl. 9.

Over 200 freestone peach varieties and selections were observed for adaptability and quality. Fresh-fruit evaluations are tabulated for 118 yellow-fleshed varieties. Processing data are reported on 34 of the more promising of these. Twelve varieties seemed promising for advancing the freestone peach season in the Pacific Northwest and another for prolonging it slightly. [From authors' summary. See also *H.A.*, 27: 3189j.]

3301. Kramer, S.
Der Pfirsichstein als Hilfsmittel bei der Sortenbestimmung. **(Peach stones as an aid to variety identification.)**
Dtsch. Gartenb., 1957, **4**: 324-7, bibl. 8, illus.

Mere stone dimensions are not a reliable means of identifying varieties. Nevertheless, the shape and general configuration of stones can, with practice, be used for the purpose.

3302. Lapins, K.
Progress report on artificial freezing of fruit tree material.
From abstr. in *Agric. Inst. Rev.*, 1958, **13** (3): 38.

In an attempt to develop a simple technique for screening fruit tree breeding material, 1-year-old twigs of 40 apple varieties were subjected to cold treatment in December, January or February. The effects of low temperature were evaluated by 3 methods: estimates of discoloration of affected tissues, observations on recovery of forced twigs, and measurements of electrical conductivity in exosmosis water of frozen twigs. Treatments in December and January gave more reliable results than those in February. If the February treatments were excluded, there existed highly significant correlations (at 1% level) between the results obtained by all three methods of evaluating injury. Estimates of discoloration might be omitted, since they give parallel values with the recovery ratings. Electrical conductivity registered the fine differences between varieties with a low degree of injury, while the recovery ratings were valuable in recording severe injury. Correlations were generally high between the varietal behaviour in December and January. In comparing the performance of the same varieties in two years, it was found that the recovery ratings were more consistent than the measurements of electrical conductivity. The values of electrical conductivity were very sensitive to even slight variation in the twig samples. Using uniform samples from trees grown under comparable conditions, artificial freezing tests gave reliable results, and the method shows definite promise as a tool in fruit tree breeding.—Canada Dep. Agric., Summerland.

3303. Wilner, J.
Seasonal changes in electrical conductance of twigs of woody plants used in home orchards and windbreaks on the Canadian Prairies.
From abstr. in *Agric. Inst. Rev.*, 1957, **12** (3): 39.

Results of study during the period of April 18, 1955, to April 3, 1956, at the Forest Nursery Station, Indian Head, Sask., indicated that increased cellular activity of woody twigs was accompanied by greater electrical conductance. This made it possible to distinguish certain active and dormant periods of plants of *Malus* spp., *Prunus* spp. and other species commonly used on the Prairies for windbreak and ornamental purposes. Preliminary work showed that more uniform results in connexion with winter hardiness studies may be anticipated when woody twigs are tested in the autumn, as compared with mid-winter or early spring season. Evidence was found to indicate that electrical conductance of tissues is a persistent inherent trait in woody plants which might be attributed to difference in permeability of protoplasmic membrane to solutes as well as to differences in nature and concentration of the solutes.

Rootstocks and propagation.

(*See also* 3400f, r, t, v, 3401b.)

3304. Tokar, L. O.
Commercial trials on the use of self-rooted fruit trees. [Ukrainian, with Russian summary.]
Nauk. zap. Kijivs'k. Un-ta, 1955, **13** (16): 25-35, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 78,249.

From observations conducted on fruit trees raised from seed or suckers in various parts of the U.S.S.R. it is concluded that self-rooted trees are sufficiently typical for the given varieties and are more vigorous than grafted trees. Examples of apple, pear, cherry and plum varieties are given in support of this, and the use of self-rooted trees of certain varieties, as well as grafts on standard rootstocks, is recommended.

3305. Böhm, G.
Beitrag zur autovegetativen Vermehrung einiger Apfelsorten. (**A report on the propagation of some apple varieties on their own roots.**)
Dtsch. Gartenb., 1957, **4**: 241-4, bibl. 10, illus.

Rooting of 12 apple varieties was studied, using M.IX as nurse roots. Rooting ability was best with James Grieve, Goldparmäne, Berlepsch and Croncels, but was poor with Zuccalmaglio; rooting of the remaining varieties was between 30% and 50%. By the second year 57·4% of James Grieve plants but no Jonathan plants were fit for transplanting.

3306. Budagovskij, V. I.
Forms of dwarfing apple rootstocks and their distribution. [Russian.]
Sad i Ogorod, 1958, No. 5, pp. 34-8, bibl. 1.

In discussing nomenclature the author comments on the convenient East Malling classification, but suggests that, instead of using the word type, "doucin" should be used for semi-dwarfing and "paradise" for dwarfing stocks, thus doucin II, III, IV and V and paradise VIII and IX. The others not belonging to either group should be called types, i.e. types I, VI, XII, XVI, etc.

3307. Preston, A. P.
Apple rootstock studies: thirty-five years' results with Cox's Orange Pippin on clonal rootstocks.
J. hort. Sci., 1958, **33**: 194-201, bibl. 12.

The growth and cropping of Cox's Orange Pippin apple on 11 clonal [Malling] rootstocks up to 35 years of age are reported. Trees on M.I, M.II, M.IV, M.IX and M.XVI are dealt with in detail. The relative order for tree size on the 5 main rootstocks was established by the fifteenth year and this agreed with results reported earlier for Lane's Prince Albert on the same rootstocks. The order for cropping was established by the twenty-fifth year, with the exception of trees on the very vigorous M.XVI, the hard pruning of this variety having delayed the onset of bearing with trees on vigorous and very vigorous rootstocks. Trees on the dwarfing M.IX yielded the heaviest accumulated crop during the early years but they were superseded by trees on the moderately vigorous M.IV by the fifteenth year, these trees in turn being superseded by those on the vigorous M.II by the twenty-fifth year. Trees on M.II were eventually surpassed by those on the very vigorous M.XVI by the thirty-second year. The heaviest annual yield was recorded in the twenty-sixth year. The yields are discussed in relation to tree spacing. The ratio of total crop to weight of trunk and branches on trees grubbed at 22 years of age showed that those on the dwarfing M.IX had yielded 8 times their own weight in fruit, whereas trees on the very vigorous M.XVI had yielded less than twice their own weight. The cultural requirements of this difficult dessert apple were not thoroughly understood during the early years of the trial, consequently trees on M.IX were the only ones that had yielded a total crop of a bushel per tree by the tenth year. Under improved cultural conditions trees on M.II have, since the twentieth year, averaged annually over 300 bushels per acre and this rootstock has given a good all-round performance with Cox's Orange Pippin. [Author's summary.]—East Malling Res. Stat., Kent.

3308. Jepsen, H. M., and Christensen, J. V.
Grunstammer til aebletraeer. II. (**Rootstocks for apple trees. II.**) [English summary 2 pp.]
Tidsskr. Planteavl, 1958, **62**: 208-58, bibl. 15.

At 2 experiment stations in Denmark 8 apple varieties have been tested on 6 Malling stocks, a crab stock and Lund stock. Data are given on rootstock effect on fruit yield per tree, and on yield in relation to tree size. Rootstock had no significant effect on fruit size. [For part I, see article by N. Esbjerg, *ibidem*, 1928, **34**: 640-65.]

3309. Säkö, J.
Av frögrundstammar förorsakade variationer hos äppelträd. (**Variations in apple trees due to seedling rootstocks.**) [English summary ½ p.]
Sver. pomol. Fören. Årsskr 1957, pp. 85-98, bibl. 31.

Variations in annual yields from individual trees growing on seedling rootstocks were greatest in young trees, and differences became smaller as tree age increased. Wide divergences in annual yields were reduced sooner in early-bearing varieties than in later-bearing varieties. Comparison of Antonovka and Transparente Blanche on seedling and Malling stocks showed less variation in yields on seedling stocks than on clonal stocks. Antonovka on seedling stocks showed greater growth variation than on Malling stocks, but growth variation was less with Transparente Blanche. Among spindle bush trees there was greater variation in growth on M.II than on M.IX.

3310. Säkö, J.
Eräiden suvuttomasti ja siemenistä lisättyjen perusrunkojen vaikutuksesta omenapuiden menestymiseen suomessa. (**The effects of some clonal and seedling rootstocks on apple trees in Finland.**) [English summary 5 pp.]
Valt. Maatalousk. Julk, **165**, 1958, pp. 90, bibl. 145, illus.

Detailed results are given of trials with Malling apple rootstocks carried out at 5 localities in Finland from 1943 to 1955. In general trees on seedling stocks and on M.XII and M.II were hardier than trees on the other Malling stocks, M.IV being the least hardy. The most vigorous growth was made by trees on M.XII, followed by those on seedling stocks; M.VII was generally the most dwarfing. In general trees on M.I, II, IV and VII did not yield appreciably more during the first years than those on seedlings. From 8–10 years from planting onwards, trees on seedling stocks generally cropped more heavily than those on Malling types. In the spindlebush trials M.IX was more productive than M.II until about the 8th year from planting. Variations in growth and yield among rootstocks and scion varieties are analysed. The anchorage of seedling rootstocks and M.XII was better than that of the other Malling stocks; M.IV had particularly poor anchorage. Some incompatibility was observed between M.IV stock and Åkerö, Lavia and Melba scions, and between A2 stock and Åkerö and Melba scions.—Agric. Res. Centre, Piikkiö.

3311. RJADNOVA, I. M.
Increasing the frost resistance of the skeleton branches of apple. [Russian.]
Agrobiologija, 1958, No. 2, pp. 144-8, illus.

In the Kuban the wood of late apple varieties is often frost damaged, owing to late maturation, while that of early varieties is frost resistant. By framework grafting on the 2–3 lower branches of resistant trees, hardiness was greatly improved. With the leading variety Renet Simirenko, the best results were obtained with frameworking onto Naliv No. 1; Borovinka produced less vigorous but earlier bearing trees.

3312. BUKOVAC, M. J., WITTWER, S. H., AND TUKEY, H. B.
Effect of stock-scion interrelationships on the transport of ^{32}P and ^{45}Ca in the apple.
J. hort. Sci., 1958, **33**: 145-52, bibl. 11, illus.
BUKOVAC, M. J.
Effect of stock-scion interrelationships and graft unions upon nutrient absorption and transport in higher plants as indicated by radioactive isotopes.
Diss. Abstr., 1958, **18**: 15-16, being *Publ.* 24,247 of 148 pp.

Rooted cuttings of M.VII and IX apple rootstocks absorbed less P^{32} than did M.XVI. McIntosh scions on M.VII or IX absorbed and accumulated less P^{32} from root and leaf applications than those on M.XVI or Delicious seedling stocks. Less Ca^{45} was absorbed by McIntosh on the dwarfing stocks than on the vigorous stocks. No marked accumulation of P^{32} or Ca^{45} was observed at the bud union. Genetically dwarf and non-dwarf tomato plants absorbed equal quantities of foliar-applied P^{32}, but less was translocated to the roots in dwarf plants. Tomato plants which were chemically dwarfed by MH treatment absorbed less foliar-applied P^{32} than normal plants, but no subsequent differences in distribution were observed. In grafted tomato plants there was no accumulation of P^{32} at the graft union, which did not appear to impede translocation of P^{32} to upper parts of the plants. Well-formed graft unions did not impede acropetal transport of radioactive Na, S, Cl, Ca, Mn, Fe, Cu, Zn, Rb, Sr, Mo and Ba from the roots. When laterals of vigorous plants were grafted "apex to apex", transport of P^{32} was significantly reduced and that of Ca^{45} was almost completely blocked. The inversion of phloem segments in stems of 1-year-old apple trees (M.I) resulted in a greater accumulation of foliar-applied P^{32} above the inverted segments than above segments which had been removed and replaced in a natural position. Approximately 60% more adventitious buds grew below inverted than below non-inverted phloem rings. Swellings immediately above the upper phloem ring and reduced top growth were evident on trees with inverted as compared to non-inverted phloem rings. Scion growth measured by dry weight and terminal growth was significantly affected by its orientation. Less Ca^{45} absorbed by roots accumulated in inverted scions 2 or 6 days after treatment than in non-inverted scions or in stems of non-grafted plants. However, when Ca content was expressed as counts per min. per g. dry weight, no significant differences were observed, thus indicating that growth and not the union was the determining factor. Anaesthetized bean and radish leaves transported considerable amounts of foliar-applied Ca^{45} to other parts of the plants. Chelation of Ca^{45} with disodium EDTA, picrolinic acid, 2,5-dichloro-3,6-dihydroxy-p-quinone and 1-amino-2-naphthol-4-sulphonic acid did not affect its basipetal transport.—Mich. St. Univ.

3313. JOHANSSON, E.
Doyenné du Comice och dess odlingsvärde.
(Doyenné du Comice and its cultural value.)
Sver. pomol. Fören. Årsskr. 1957, pp. 23-9, illus.

Growth and yield of Comice pears were compared on quince B, quince C, B 1/10 clone and seedling pear stocks, with or without interstocks. In 9-year-old trees on all stocks growth increments were smaller with interstocks than with direct grafting. The highest average annual yields were produced by trees on quince, both with and without an interstock, and on seedling stocks without an interstock. The use of an interstock with seedling stocks caused a sharp drop in yields. On quince stocks fruits were larger and ripened earlier (in particular when interstocks were used) than on seedling or clonal pear stocks.

3314. MOSSE, B.
Further observations on growth and union structure of double-grafted pear on quince.
J. hort. Sci., 1958, **33**: 186-93, bibl. 8.

A 9-year-old incompatibility trial of double-grafted pears on quince B rootstock is described, and the results are related to an earlier examination of similar 2-year-old trees. It is confirmed that incompatibility could not always be forecast from the growth of 2-year-old trees, but that it was predictable from the structure of their unions. The union structure between pear intermediates and quince rootstocks was slightly worse if top-scion and intermediate were of different varieties, irrespective of the compatibility of the top-scion itself. Abnormalities in the structure of the secondary phloem in the roots appeared to be closely associated with quality of the union, and this gives hope that a method may be found of assessing union structure without destroying the tree. For all symptoms of incompatibility recorded there was a continuous range from horticulturally compatible to horticulturally incompatible combinations. It is suggested that great variability is a feature characteristically associated with incompatibility, and some of the difficulties arising from this are discussed. [Author's summary.]—East Malling Res. Stat., Kent.

3315. Dullum, N., and Dalbro, K.
Forsøg med forskellige grundstammer til blommetraeer 1935-1955. (**Trials with several rootstocks for plums, 1935-1955.**) [English summary 1½ pp.]
Tidsskr. Planteavl, 1958, **62**: 292-323, bibl. 4, illus.

In trials with 4 plum varieties on seedling and clonal stocks, the highest yields were obtained on myrobalan, either clonal or seedling. The disadvantages of myrobalan are its late maturity and frost susceptibility. Trees on Pershore and St. Julien A gave satisfactory yields, combined with moderate growth and frost and disease resistance.

3316. Hartmann, H. T., and Hansen, C. J.
Effect of season of collecting, indolebutyric acid, and pre-planting storage treatments on rooting of Marianna plum, peach, and quince hardwood cuttings.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 57-66, bibl. 8, illus.

IBA stimulated rooting in Marianna 2624 plum and Peach Rootstock No. 7, but was unnecessary for quince which rooted well without treatment. Autumn- or spring-planted plum rooted equally well if treated with IBA, but only autumn-planted cuttings rooted readily without treatment. Plum rooted best when the cuttings were taken in mid-November, treated with IBA, stored for 6 weeks at 60° F. in a damp mixture of ½ vermiculite ½ perlite and then moved to cold storage (36° F.) until planting in the spring. In quince cuttings a marked clonal difference in rooting capacity was apparent. Rooting decreased towards the distal part of the shoot. With peach cuttings the treatment which gave the best rooting resulted in poor survival of plants. Cuttings taken in mid-November, treated with IBA and planted immediately gave a moderately successful stand (32%).—Univ. Calif., Davis.

3317. Brooks, H. J., and Hough, L. F.
Vernalization studies with peach embryos.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 95-102, bibl. 10, illus.

The germination of embryos of immature Elberta fruits was increased by 1–3 weeks' vernalization at 4° C., but germination of embryos from mature fruits of early ripening peaches was not significantly affected. Germination of early ripening embryos in sphagnum moss was 13%, handled aseptically in nutrient agar 21%, and in agar+2% sucrose 83%; survival after transplanting was 22%, 4% and 81% respectively. With the aseptic handling and agar+sugar treatment the embryos of all early-ripening selections, taken at intervals between 70 and 102 days after flowering, germinated and were planted out.—N.J. agric. Exp. Stat., New Brunswick.

3318. Hartmann, H. T., and Brooks, R. M.
Propagation of Stockton Morello cherry rootstock by softwood cuttings under mist sprays.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 127-34, bibl. 10, illus.

Stockton Morello sour cherry, a valuable cherry rootstock in California, is susceptible to necrotic rusty mottle virus. A few trees free of this virus, however, exist and propagation by cuttings from such trees would enable large scale production of rootstocks free of n.r. mottle. Leafy softwood cuttings were rooted in relatively high percentages under mist sprays when terminal cuttings were taken in late spring and early summer from shoots in active growth and treated with indolebutyric acid. Greenhouse mist beds gave satisfactory results early in the season (May), but out-of-door beds gave better rooting later in the season (June). Under these same conditions leafy cuttings of mahaleb and Montmorency were readily rooted. Cuttings of sweet cherry clones rooted with much more difficulty. [From authors' summary.]—Univ. Calif., Davis.

3319. Hu, H.-L.
Trials on grafting loquat. [Chinese, with English summary.]
Acta agric. sinica, 1956, **7** (2): 181-92, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 78,334.

Loquat (*Eriobotrya japonica*) is widely grown in the Szechwan province, China. In grafting experiments started in 1951 at Hanchow scions from well matured 1-year-old shoots were found to be the most suitable. When grafted on *Photinia serrulata* in the glasshouse take was low, but outdoors it reached 60–70%. Grafting on persimmon seedlings in March–April resulted in 86% take. Bench grafting in the winter was unsatisfactory.

Growth phenomena.

(*See also* 3244, 3266, 3400u.)

3320. Wareing, P. F., and Nasr, T.
Gravimorphism in trees. I. Effects of gravity on growth, apical dominance and flowering in fruit trees.
Longman, K. A., and Wareing, P. F.
Idem. II. Effect of gravity on flowering and shoot growth in Japanese larch (*Larix leptolepis*, Murray).
Nature, 1958, **182**: 379-80, bibl. 8, and 380-1, bibl. 2.

The effect of orientation of the shoot on its growth was studied in apple, cherry, plum and black currant, using potted maiden trees restricted to a single shoot in the second year. In all species total growth of the horizontal plants was markedly less than that of the vertical controls, the effect being accentuated when the horizontal plants were rotated twice daily. In cherries and plums the reduced growth was due to both fewer and shorter internodes, while in apples and black currants differences were mainly due to reduced internode length. Two experiments are reported on the interaction between apical dominance and the effects of gravity, using 1-year-old layers of apple rootstock MM. 111, pruned back to 24 in. with subsequent growth restricted to 3 laterals trained vertically or horizontally. Growth of all shoots was less in the horizontal position, but the uppermost shoots showed a greater percentage reduction when trained horizontally than did the lower shoots. Apical dominance was well marked in the uppermost shoot when it was trained

vertically, but very slight when it was trained horizontally. The orientation of the shoot also had a marked effect on flower initiation in apple rootstock No. 3436. The 2-year-old layers grown vertically initiated very few flowers, but those grown horizontally showed heavy flowering on both spurs of 2-year shoots and on 1-year shoots. Similar effects on flower initiation were observed on cherry rootstock F 12/1.
In the second paper experiments are reported on the horizontal or downward training of larch branches. The greater the branch angle from the vertical, the heavier was the flowering and the less the extension growth. By downward training trees could be brought into heavy flowering at an age when they would normally bear few or no flowers. There was a clear-cut zoning of flower buds to loci in which they would point downwards or horizontally.—Univ. Manchester.

3321. Vitkovskij, V. L.
Annual phasic development in the reproductive buds in top and small fruits. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **119**: 174-7, bibl. 11, illus.

In a physiological study of bud development in tree and bush fruits it was found that a secondary meristem differentiates in the axils of the primordial leaves of the central bud. This secondary tissue only develops to a small extent in the first year, but in the following year it may grow into either a replacement shoot or into a flowering spur. The development of these lateral buds is dependent on adequate winter chilling. The plants studied included currants and gooseberries and pome and stone fruits.

3322. Petrov, A. V.
The development of apple shoots. [Russian.]
Doklady Mosk. s.-h. Akad. im. K. A. Timirjazeva, 1956, No. 26, pp. 221-5, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 78,270.

Certain relationships, important for selection work, have been revealed in a study of annual shoot growth of apple. The effect of light on the structure of the shoots was established, and an index of the relationship between the length of the shoot and the number of its leaves was found. Variability in the size of the different morphological structures was determined within the limits of one variety and between varieties. Relationships were also found between size of leaf, length of petiole and length of internode, which were useful in distinguishing between light-loving and shade-tolerant varieties.

3323. Kovalev, N. V., Gluščenko, K. S., and Tupicyn, D. I.
Cessation of growth in fruit trees in the summer. [Russian, with Uzbek summary.]
Doklady AN UzSSR, 1956, No. 4, pp. 45-9, from *Ref. Ž.* (*Biol.*), 1957, No. 16, Abstr. 69,364.

The influence of cultural practice on shoot growth in apples was studied over 8 years. It was found that neither cultural practices, including manuring and irrigation, nor day length or soil and air temperatures were the cause of growth cessation. Under optimum moisture conditions the basic cause was the sharp increase in leaf area towards the end of May. Cessation of growth appears to promote fruit bud differentiation and is due to a disturbance in the water balance. Since at this time water uptake by the root system is limited, increasing the soil moisture content above 75% of field capacity could not prolong or renew growth.

3324. Anstey, T. H.
Determining base temperatures for heat unit studies with tree fruits.
From abstr. in *Agric. Inst. Rev.*, 1957, **12** (3): 40.

Theoretically, the base temperature used in phenological studies with physiological growth stages of plants is that temperature at which growth begins. In practice, however, it is difficult (*a*) to determine directly the temperature at which growth is active for various species, and (*b*) to calculate accumulated temperatures above this base in time units such that the base so calculated is effective. A method of determining effective base temperatures for predicting blossoming dates is presented for various kinds of deciduous fruit. —Canada Dep. Agric., Summerland.

3325. Anstey, T. H.
Predicting deciduous fruit blossoming dates from temperature data.
From abstr. in *Agric. Inst. Rev.*, 1957, **12** (3): 31.

During the period 1937-1946, McIntosh apples have bloomed at Summerland from April 25 to May 26 with a mean bloom date of May 11. McIntosh apples require 969±59·7 degree-day heat units from February 1 with a base of 43° F. to full bloom. Two methods of predicting full bloom dates on April 3 or April 13 are compared. The prediction of other deciduous fruit-tree bloom dates is discussed.—Canada Dep. Agric., Summerland.

3326. Rudloff, C.-F., and Lucke, R.
Funktionelle Tendenzen der reproduktiven Organe des Apfels. 3. Zum Fruchten der Langtriebe und Kurztriebe zweier Apfelsorten. **(Functional tendencies of the reproductive organs in apple. 3. Fruiting of long shoots and spurs in 2 apple varieties.)**
Gartenbauwiss., 1958, **23**: 29-42, bibl. 13, illus.

Reproductive potentials of long and spur shoots were compared on Belle de Boskoop and Goldparmäne on different stocks. Fertility was highest in the terminal inflorescences of long shoots, and lowest in their lateral inflorescences, with spur shoots showing intermediate fertility. There was no difference between 3 graft combinations in fertility of all inflorescences of long shoots and spurs, but with Goldparmäne on M.IX long shoots were more fertile than spurs. The proportion of fruit borne by long shoots in relation to total yield was higher than that borne by spurs. [For part 2, see *H.A.*, 28: 2175.]—Inst. Obstb. Gemüseb., landw. Hochsch., Hohenheim.

3327. Strietman, H.
Welke bloem van de bloemtros zet? **(Which flower in the truss will set?)**
Fruitteelt, 1958, **48**: 579-80.

The second flower of the inflorescence was the most likely to set in 7 of the 9 apple varieties tested. Most of the flower trusses observed had 6 flowers.—Rijkstuinbouwconsulentschap, Hoorn.

3328. Proebsting, E. L., Jr.
A quantitative evaluation of the effect of fruiting on growth of Elberta peach trees.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 103-9, bibl. 7.

A negative correlation between crop yield and increase in trunk cross-section was constant over 3 years and 4 levels of N, and a constant is given relating growth to yield. This relationship was shown to be affected by factors influencing general vigour, and when differences in vigour were greater than differences in crop, it became positive. Characteristics of the growth-yield diagram and differences in efficiency due to abnormal cropping are discussed.—Irrig. Exp. Stat., Prosser, Wash.

3329. Brown, D. S.
The relation of temperature to the flower bud drop of peaches.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 77-87, bibl. 1.

Correlations between the average flower bud drop of 14 peach varieties and the temperatures experienced during the autumn and winter months for 5 seasons indicated that above average temperatures in late September and early October may cause the breakdown which results in bud drop. December and January temperatures were just as important in relation to bud drop as were those in early autumn. In December the minimum temperatures were more highly correlated with bud drop than were the maxima, while in January the reverse was true. Temperatures recorded by a distance thermograph with the sensitive element painted black and mounted above the weather shelter were more highly correlated with bud drop than were temperatures recorded by a thermograph within the weather shelter. [From author's summary.]—Univ. Calif., Davis.

3330. Sahlström, H.
Mikroklimat och fruktodlingsklimat. (**Microclimate and fruit-growing climate.**)
Sver. pomol. Fören. Årsskr. 1957, pp. 39-47, illus.

Flower development of a wall-trained peach against a south wall was significantly faster than in one trained on wires. With fruit development, differences were only significant until mid-July. There was no significant difference in fruit development on a wall-trained peach at 40 cm. and 80 cm. above soil level. Fruit development at 80 cm. above soil level was significantly faster on cordon apples than on trees in the open.

3331. Milicić, D.
Beiträge zur Fruchtanatomie des Pfirsichs. II. Riss- und Wachsbildungen in den Membranen des Epikarps. (**Studies on the anatomy of peach fruits. II. Cracks and wax formation in the epicarp cell wall.**)
Acta bot. Inst. Bot. Univ. Zagreb, 1956, **14/15**: 127-44, illus., from *Biol. Abstr. Sect. D*, 1958, **32**, Abstr. 17,259.

The outer epidermis of the epicarp of the nectarine (*Prunus persica* var. *nucipersica*) contains, in the outer cell-walls below the cuticle, cuticular layers of considerable thickness, and in the lateral walls well developed cuticular ribs. Because of considerable tension in the epicarp of developed fruits the cutinized parts of the epidermal walls may break up in many places. Two main forms of crack are produced; the outer cracks are produced because of breaking in the cuticle and cuticular layers and are therefore open, and the other, inner cracks are caused only by the breaking of the cuticular ribs and are therefore enclosed in the inner cell-walls. When cracks occur they do not extend appreciably to the neighbouring uncutinized membrane, which possesses considerable elasticity; the protoplasts enclosed by this membrane thus continue, for the most part, to function normally. The outer, and even more frequently the inner, cracks may be filled with wax inclusions. These inclusions possess a characteristic structure, which is described.

3332. Sergeev, L. I., and Sergeeva, K. A.
Characteristics of the annual growth cycle and frost resistance in woody plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **119**: 823-5, bibl. 8.

In Baškiria the annual growth cycle and certain physiological features of the frost-resistant *Tilia cordata*, *Prunus racemosa*, *Phellodendron amurense* and *Prunus maackii* were compared with those of 2 varieties of apple, 1 of cherry and *Prunus fruticosa*, which are all frost susceptible. The resistant plants started and finished growth earlier, and their leaves had a greater water-retaining capacity and a lower intensity of respiration.

Pollination.

(*See also* 3400y.)

3333. Sedov, E. N.
The effect of the pollen of pollinating varieties and pollen mixtures on the physiological processes in apple seedlings. [Russian.]
Fiziol. Rast., 1958, **5**: 193-6, bibl. 10.

The water content and photosynthetic activity of the leaves were highest in apple seedlings from seeds obtained by cross-pollination with mixed pollen, and lowest from those self pollinated, those cross-pollinated with single pollen being intermediate. To increase the vitality of seedling rootstocks it is recommended that mother-seed plantings of apple should include 2–3 pollinating varieties.

3334. Kramer, S.
Mitteilung über die Selbstfertilität beim Ontarioapfel. (**A communication on self-fertility in the Ontario apple.**)
Dtsch. Gartenb., 1958, **5**: 158-60, bibl. 13, illus.

The tendency of Ontario to self-fertility and parthenocarpy has been confirmed in 2 years' experiments. Seed formation did not appear to be apomictic. Seeds from self-fertilization were larger than those from open pollination, but seedling growth from such seeds was weaker. It is suggested that the tendency to self-fertilization is inherited.—Inst. Sonderkult., Karl-Marx Univ., Leipzig.

3335. Vdovceva, T. A.
Pollen germination in peach and plum crosses. [Russian.]
Agrobiologija, 1958, No. 2, pp. 133-6, bibl. 8.

In reciprocal cross-pollination of peach with plum, pollen tube growth during the first 20 hrs after pollination was better than in intervarietal cross-pollination, but after 24 hrs the growth of the foreign pollen was retarded. It is thought that lack of success in crossing peach with plum is due to the retarded growth of the pollen tubes into the pistil.

3336. Crescimanno, F. G.
Ricerche sulla biologia fiorale del nespolo del Giappone. (**Studies on the floral biology of the loquat.**) [French and English summaries 10 and 11 lines.]
Riv. Ortoflorofruttic. ital., 1958, **42**: 107-20, bibl. 1, illus.

Floral biology is described for 14 loquat varieties, many of which were self-compatible. The 3 most important varieties, however, set very little fruit without cross-pollination. Suitable varieties for pollinating these are discussed.

Nutrition and soil management.

(*See also* 3269, 3401c, d, 3510.)

3337. Kobel, F.
Die Versorgung der Obstbäume mit Mineralstoffen. (**Mineral nutrition of fruit trees.**)
Gartenbauwiss., 1958, **23**: 43-53.

The author discusses mineral nutrition with reference to a study at Wädenswil where Goldreinette von Berlepsch trees on M.IX were grown with nutrient solutions in a poor podsol. Deficiency symptoms of major and minor nutrients are described, and ion interrelationships noted.

3338. Fernand, —., and O'Grady, L.
Étude du rapport N-K de la feuille du pommier McIntosh vs production, coloration et conservation des fruits. (**A study of the N/K ratio in the leaves of McIntosh apples in relation to yield, colour and storage of the fruit.**)
Rev. d'Oka, 1958, **32**: 87-8.

From a study of 61 samples it was concluded that production and (with one exception) cold storage behaviour were not significantly affected by different levels of N or K in the foliage. Coloration appeared to depend on N and K levels and the optima were: N 2·3%, K 1·7% and N/K 1·3.

3339. Shibukawa, J., and others.
Studies on leaf analyses of apple trees. I. A leaf analyses survey of apple orchards, (4) and (5). [Japanese, each with English summary 1 p.]
Misc. Publ. Aomori Apple Exp. Stat. **8** and **9**, 1956 and 1957, pp. 7 each.

Two further years' records are given of studies previously reported in *H.A.*, 26: 1442. The general conclusions remain substantially unchanged, but the critical leaf contents for N, P and K are now assessed as follows: Ralls, 3·10, 0·13 and 1·10, Jonathan, 2·70, 0·12 and 1·00, Delicious, 2·90, 0·14 and 1·20.

3340. Tukey, H. B., Jr., and Amling, H. J.
Leaching of foliage by rain and dew as an explanation of differences in the nutrient composition of greenhouse- and field-grown plants.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 876-81, bibl. 7, illus.

Foliar analysis of orchard-grown apple trees showed a lower concentration of leachable nutrients in trees in the open than in trees protected from rain by a plastic roof. Similarly, sun leaves of blueberry fully exposed to the action of rain and dew contained a lower concentration of leachable nutrients than did the partially protected shade leaves. [From authors' summary.]

3341. Dotti, F., Lalatta, F., and Lalatta Ronzoni, G.
La diagnostica fogliare del pesco. Perfezionamenti del metodo. (**Foliar diagnosis in peach. Improvements in the method.**) [English summary ¾ p.]
Ann. Sper. agrar., 1958, **12**: 393-415, bibl. 1.

Several different peach varieties and localities were included in detailed studies of major-element nutrition. The best period for sampling was early July to early August. The minimal nitrogen status of leaves for satisfactory growth comprised 238 mg. atoms per 100 g. of dry matter, corresponding amounts of P and K being 6 and 57 mg. atoms respectively. The upper limits were 251, 6 and 75 mg. atoms of N, P and K respectively. High yields were correlated over a 4-year period with a high major-element content of foliage and tended to deplete foliar K, but did not exhaust N or P reserves, although by harvest time foliar nutrients were lower in high-yielding than in less productive trees. Spring drought severely checked absorption of nutrients from the soil and from fertilizers.

3342. Burrell, A. B.
Boron in apple leaves and fruits as influenced by sodium pentaborate sprays.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 20-5, bibl. 7.

One sodium pentaborate spray per annum applied 1–3 weeks after petal fall was sufficient to maintain the B content of the fruit. The greater solubility of the compound made it preferable to borax for incorporation in concentrate sprays, and no reduction in pest control was observed by so doing. No clear cases of increased spray injury due to the inclusion of sodium pentaborate were found, although this point should be further studied. In mature eastern orchards one 4 lb./ac., or if preferred two 2 lb./ac., applications should be made, and in western orchards 5 lb./ac. No consistent correlation was found between the B content of leaves in midsummer and that of pre-harvest fruit flesh.—Cornell Univ., N.Y.

3343. Weeks, W. D., and others.
The effect of varying rates of nitrogen and potassium on the mineral composition of McIntosh foliage and fruit color.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 11-19, bibl. 9.

Increased rates of N fertilization caused increases in leaf Ca and Mg and decreases in K and PK fertilizers increased leaf K. Crop size affected the chemical composition of the foliage. Increased rates of N did not always increase yields. N was a more important factor in increasing yield in seasons unfavourable for pollination and fruit set than in favourable weather. Red fruit colour was associated with both N and K levels in the leaves; K appeared to counteract the lowering effect of N on colour in some cases.—Mass. agric. Exp. Stat., Amherst.

3344. Karnatz, H.
Über die Wirkung von Harnstoffspritzungen bei Apfelsämlingen im 1. Lebensjahr. (**The action of urea sprays on apple seedlings in their first year.**)
Mitt. ObstVersuchsringes Jork, 1958, **13**: 152-4, bibl. 1.

Two or 4 urea sprays (0·6%) were applied to apple seedlings at 10-day intervals with routine fungicide sprays. Treated seedlings were taller than controls, but there was little difference between 2 and 4 spray applications. Mildew infection was much lower in sprayed seedlings than in untreated controls, and plants sprayed 4 times were more resistant than those sprayed twice.

3345. Schneider, G. W., Jones, I. D., and McClung, A. C.
Studies of pruning effects, and of rate and time of nitrogen fertilization on certain chemical and physical characteristics of the peach fruit.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 110-15, bibl. 4.

Severe pruning increased fruit firmness and acidity. Soluble solids were increased by N application in medium and heavily pruned trees, and also by an early N application as against split dosages. Annual variations in environment appeared to have a greater effect on the fruit characteristics studied than did the differences in treatments.—N.C. St. Univ., Raleigh.

3346. Parups, E., and others.
Growth and composition of leaves and roots of Montmorency cherry trees in relation to the sulfate and chloride supply in nutrient solutions.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 135-44, bibl. 22.

One-year-old Montmorency cherry trees were grown in nutrient solutions with varying levels of sulphate and chloride used separately and in combination. High levels of both sulphate (672 p.p.m.) and chloride (671 p.p.m.) reduced growth. High chloride without sulphate produced chloride toxicity symptoms; the absence of both produced sulphur deficiency symptoms. The addition of sulphate prevented the expression of chloride toxicity, and that of chloride the expression of sulphur deficiency. Increasing chloride depressed K in the leaves but had little effect on Ca and Mg. Increasing sulphate depressed Ca and Mg but had little effect on K. Increasing chloride also increased P and Mn in the leaves, but increasing sulphate decreased Zn. The composition of fibrous roots, while not as variable, was similar to that of leaves. There was a tendency for the heavy metals to be retained in the roots. [From authors' summary.]—Centr. exp. Farm, Ottawa, and Mich. St. Univ., East Lansing.

3347. Karnatz, H.
Der Einfluss verschiedener Vorkulturen auf die Bestandsentwicklung in einer Apfel-Niederstammanlage. (**The influence of the preceding crop on the development of half standard apple trees.**)
Mitt. ObstbVersuchsringes Jork, 1958, **13**: 195-8.

In the Alte Land an apple orchard was planted on high land, part of which had previously borne a fruit tree nursery. Although there is no direct evidence that the trees were affected by the previous crop, the indication is that fruit trees should not be planted on nursery soil which had carried the same species.

3348. Müller, K. W.
Beobachtungen über den Einfluss des Bodenprofils auf die Bewurzelung von Obstbäumen. (**Observations on the influence of the soil profile on the rooting of fruit trees.**)
Süddtsch. ErwGärtn., 1956, **10**: 156, from abstract in *InformDienst Weihenstephan*, 1958, No. 3, p. 50.

Lack of growth in two apple varieties constituting several rows of an otherwise healthy orchard was found to be due to strata of iron-containing sand in the subsoil. Fine roots responsible for the nutrition of the trees were present only in the loam and not in the sand. Deficiency symptoms did not appear in affected trees.

3349. Proebsting, E. L., and Warner, R. M.
Some effects of non-cultivation on orchard soils.
Proc. 12th annu. Res. Conf. Calif. Fig Inst., *1958*, pp. 12-14.

When soils from cultivated and uncultivated orchards were compared it was found that the surface soil in both cases had the same degree of compaction but that the soil 6–12 in. below the surface was more compact in the cultivated orchard. Roots were scarce in the top soil of the cultivated plots but came to within 3 in. of the surface in the non-cultivated areas. Analyses showed that leaf N was the same in leaves from nectarine trees on both plots but leaf P and K was greater on the non-cultivated than on the cultivated plots, although this did not result in any difference in growth or yield. The advantages and disadvantages of non-cultivation in fruit and nut orchards are discussed. J.R.L.

3350. Butijn, J., and Schuurman, J. J.
Bodembehandeling op het proefveld te Hoofddorp. De invloed van verschillende bodembehandelingen op de eigenschappen van de bodem en op de opbrengst en wortelgroei van appelbomen. (**Soil management at the experimental field at Hoofddorp. The effect of various soil management practices on soil properties and on yield and root growth of apple trees.**) [English summary 3½ pp.]
Versl. landbouwk. Onderz. **63.16**, 1957, pp. 102, bibl. 43, illus.

The soil of the experimental plot was a marine silt on sand, and the effect of straw mulch, green manure, clean cultivation and grass was studied over a period of 17 years with several apple varieties on various stocks.

The soil was originally moderately low in P_2O_5 and poor in K_2O, with high Ca, but P and K levels were increased by heavy annual dressings of complete fertilizer. Tree growth and yields were lowest from the beginning in grass plots, but as the trial progressed the differences between grassed and non-grassed plots diminished. Nitrogen deficiency appeared on grass plots, but Mg and Fe deficiencies were more marked in straw mulch and clean cultivation plots than in grass plots; these deficiency symptoms were confirmed by leaf analyses. The decrease in soil moisture during the summer was considerable in grass plots, but slight in straw mulch plots. The CO_2 content of air in the top soil was highest in straw and green manure plots. Root numbers were highest in straw plots, and in these and the clean cultivation plots most of the roots were found in the top-soil. In grass and green manure plots most of the roots occurred in the subsoil. Fruit from grass plots showed the poorest keeping quality. It is concluded that the most favourable conditions for uptake of nutrients and water occurred on the straw mulch plots, from which the highest net income was obtained.

3351. Hurt, B. C., Jr.
Study indicates good demand for Pontotoc peaches.
Miss. Fm Res., 1958, **21** (2): 1, 7.

Incidentally, of 4 soil management practices tested the best was clean cultivation during the summer with crimson clover cover in the winter.

3352. Mason, A. C.
The effect of soil moisture on the mineral composition of apple plants grown in pots.
J. hort. Sci., 1958, **33**: 202-11, bibl. 10.

Apple rootstocks M.VII in pots were placed out of doors under a glass canopy. Half of the pots were watered daily ("wet" treatment) and the other half were allowed to dry to incipient wilting point before being watered ("dry" treatment). Some of the plants were harvested after 6 weeks and the remainder after 13 weeks, in order to determine the total amounts and concentrations of the elements N, P, K, Ca and Mg in various parts of the plant. Plants under the "wet" treatment grew more vigorously and absorbed larger amounts of all 5 elements. The "wet" treatment significantly reduced the concentration of N in the whole plant ($P<0{\cdot}001$), while the concentrations of P and K were significantly increased. By the second harvest the "wet" treatment produced an increase in concentration of Mg which was significant at a low level ($P<0{\cdot}05$) but there was no significant effect on Ca. In general the effects of treatments on the concentrations of elements in various parts of the plant were in the same sense as the effects on the whole plant. The significant exception was the effect on the concentration of Mg in the bottom leaves ($P<0{\cdot}001$ in July). [From author's summary.]—East Malling Res. Stat., Kent.

3353. Gužev, Ju. L.
Modifying the date of bud burst in fruit tree and oak seedlings by regulating the soil moisture. [Russian.]
Izv. Akad. Nauk S.S.S.R., Ser. biol., 1958, **23**: 104-11, bibl. 5, illus.

The effect of 6 different soil moisture conditions on time of bud burst was studied in experiments from 1954 to 1957 on seedlings of apricot, peach, cherry, plum, apple, vine and oak and on vines from cuttings. It was found that drought conditions (25–30% field capacity) induced early growth, while optimum soil moisture conditions (60–70% field capacity) throughout the experiment delayed growth.—Inst. Genetics, Moscow.

3354. Fernand, —.
Fluctuations de l'humidité dans les sols à vergers. (**Moisture fluctuations in orchard soils.**)
Rev. d'Oka, 1958, **32**: 81-2.

By keeping the soil at 80% available moisture larger apples and increased vegetative growth were obtained. Yield was increased to 537 minots/acre [1 minot=1·11 bushels] compared with 478 in the control.

3355. Emel'janov, F. A.
Irrigation of apple rootstocks. [Russian.]
Sad i Ogorod, 1958, No. 5, pp. 48-9.

In the arid climate of the south-eastern Volga region sprinkler irrigation is most suitable for seedling apple rootstocks. When various dates of application were tested it was found that the critical dates are those of the start and end of intensive growth. Approximate rates of application are suggested.

Spraying for cultural purposes.

3356. Liard, O.
Note sur les premiers résultats d'un éclaircissage chimique (1958). (**Note on the preliminary results of chemical thinning, 1958.**)
Fruit belge, 1958, **26**: 105-10.

Apple trees, Golden Delicious on M.II and M.IX, were treated on 4 different dates with NAA at 30 p.p.m. Frequency curves for flowers per bunch are given for sprayed and control trees.

3357. Fernqvist, I.
Kemisk kartgallring. (**Chemical fruit thinning.**)
Sver. pomol. Fören. Årsskr. 1957, pp. 69-73, bibl. 3.

Fruit-thinning sprays of NAA (20–30 p.p.m.) were generally successful with Cox, but results with other apple varieties were less satisfactory. No results of practical significance were obtained with Victoria plums.

Other cultural practices.

(*See also* 3400e, h, w, 3401f, g.)

3358. Baldassari, T.
Radicale trasformazione della potatura ed allevamento dei fruttiferi. (**Radical changes in pruning and training fruit trees.**)
Frutticoltura, 1958, **20**: 273-82, illus.

More and better apples were produced by leaving secondary branches to extend naturally, bending those with a vertical tendency, than by adopting the typical vase system. Formation and maintenance of orchard trees are described for the regular espalier with inclined branches, recommended for large and medium sized trees of apple, pear, cherry and peach, and for the irregular espalier recommended for pears on quince stocks and apples on dwarfing stocks.

3359. HARRIS, R. W., AND BROWN, D. S.
Summer pruning mature Merrill Beauty peach trees.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 88-94, illus.

Mature Merrill Beauty peach trees in Kern County were given a dormant type of pruning in July and August of 1953, 1954 and 1955, and in Tehama County in August of 1954 and 1955. These trees were compared with trees given the regular dormant pruning. In Kern County summer pruning compared with dormant pruning: (1) delayed blooming, (2) increased the yield 34 and 78% in 1955 and 85 and 112% in 1956 for August and July pruning respectively, (3) reduced the bud drop in 1956. The July pruning was more effective than the August pruning in producing these responses. In Tehama County summer pruning compared with dormant pruning: (1) hastened blooming, (2) had little or no effect on yield. [Authors' summary.]—Univ. Calif., Davis.

3360. VANICEK, K.-H.
Kritische Betrachtungen zum Fruchtholzschnitt bei Sauerkirschen [Diskussionsbeitrag]. **(Critical observations on pruning of fruiting wood of sour cherries.)**
Dtsch. Gartenb., 1958, **5**: 132-4, illus.

The author recommends a lighter pruning method than normal for sour cherries. In the first years of bearing, shoots at the tip of leader branches are cut back to keep a well-balanced crown. Fruiting wood of the previous year is cut back to a strong basal shoot. Crowded wood is also removed.

3361. PELTONEN, A. J.
Omenapuiden istutussyvyyskoe Viertolan koulutilan hedelmätarhassa vv. 1947-1957. **(Experiments on the planting depth for apple trees at Viertola school farm 1947-1957.)** [English summary 5 lines.]
Puutarha, 1958, **61**: 282, illus.

In sandy soil, deep planting gave the best results. In silt and loam, shallow planting gave almost the same growth, and the trees matured better in autumn. [From author's summary.]

Composition of fruit and leaves.

(*See also* 3400a, 3401i, j.)

3362. NEAL, G. E., AND HULME, A. C.
The organic acid metabolism of Bramley's Seedling apple peel.
J. exp. Bot., 1958, **9**: 142-57, bibl. 22.

The effect of various Krebs cycle acids on the respiration of disks of apple peel at various stages of maturity was measured in a Warburg respirometer. Peel tissue from apples at the pre-climacteric and early post-climacteric stages apparently contains sufficient of the Krebs cycle acids used, with the exception of succinate, to maintain oxidative processes at a maximum. The addition of malate causes a large increase in the CO_2-output of peel from post-climacteric and senescent fruit but not from pre-climacteric fruit, and a close correlation exists between the climacteric and this decarboxylation of malate. The decarboxylation of malate does not affect the rate of O_2-uptake of peel tissue. The possible part played by the decarboxylation of malate in the increased CO_2-output at the climacteric is discussed. Added pyruvate is decarboxylated by the tissue at all stages of storage life. The decarboxylation of added malate is an aerobic fermentation, resulting in the quantitative production of acetaldehyde. Although the presence of oxygen is necessary, the rate of O_2-uptake is not affected by the reaction. Pyruvate decarboxylation does not require the presence of oxygen. The O_2-uptake of peel from senescent apples can be stimulated by addition of malate, succinate, and α-ketoglutarate. No evidence was obtained, however, of oxidation of fumarate, citrate, or pyruvate. The addition of malate to senescent tissue restores the lower endogenous rate of O_2-uptake to that of early post-climacteric tissue. Succinate and fumarate are toxic to peel tissue at concentration above 0·02 M. [Authors' summary.]—Ditton Lab., D.S.I.R.

3363. GODNEV, T. N., AND SUDNIK, N. S.
Accumulation of chlorophyll a and b in the leaves of young apple seedlings. [Russian, with English summary ¼ p.]
Fiziol. Rast., 1958, **5**: 107-11, bibl. 16.

The accumulation of chlorophyll a and b in the leaves of 1- and 2-year-old apple seedlings grown under different light conditions was studied. With 1-year-old seedlings toward the end of the season the ratio of a: b chlorophyll in plants grown in full sunlight was 2·6, in plants grown at 75% of full light was 2·0 and in plants grown at 50% of full light 1·8. The values for 2-year-old seedlings were 2·4, 1·9 and 1·3 respectively. The relative increase of the b compound in the shaded plants appeared soon after the start of the experiment, becoming progressively more pronounced.

3364. NYBOM, N.
Försök med äpplemust vid Balsgård. **(Studies on apple juice at Balsgård.)** [English summary 1¼ pp.]
Sver. pomol. Fören. Årsskr. 1957, pp. 55-67, illus.

Juice contents of apples varied between 40 and 70%; triploid and tetraploid varieties had higher average juice contents than diploid varieties. A taste panel awarded the highest marks for quality to Filippa, Dronning Louise and Laxton's Superb.

3365. BATJER, L. P., AND WESTWOOD, M. N.
Seasonal trend of several nutrient elements in leaves and fruits of Elberta peach.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 116-26, bibl. 11.

In the leaves Ca and Mg accumulated throughout the season whereas N, P and K contents declined. With all elements there was a period of from 50 to 80 days without significant change. In the fruit flesh, on a % basis, Ca and Mg decreased throughout the season; an initial decline in the concentration of N, P, K and B with a subsequent rise followed by another decline coincided with the 3 stages of growth. The nutrient data (% basis) for the kernel were similar to those for fruit flesh, except for a decline in K and B during stage 2. In the endocarp on a % basis all 6 elements declined during hardening (stage 2) and then tended to level off until harvest.—U.S.D.A. and St. Coll. Wash.

3366. Rees, D. I.
The chemical constituents of Victoria plums: changes during growth on the tree.
J. Sci. Food Agric., 1958, **9**: 404-10, bibl. 15.

Analyses made on the Victoria plum at various stages of maturity for total and alcohol-insoluble solids, sugars, acids and pectins are presented. A paper-chromatographic method has been evolved for the determination of the individual sugars present. Sorbitol has been identified as a constituent of the fruit. The changes during the growth of the fruit on the tree can be divided into two periods. In the first the rate of growth of the fruit is comparatively slow. The second coincides with the ripening stage and is characterized mainly by the appearance of sucrose which is absent during the first period. [Author's abstract.]—Fruit Veg. Canning Res. Ass., Chipping Campden, Glos.

3367. Tóth, E., and Horn, E.
Ehető és hulladékrészek aránya a kajszifajták gyümölcsénél. **(The proportion of edible part to waste in the fruit of apricot varieties.)** [Russian and German summaries ½ p. each.]
Kert. szől. Főisk. Évk., 1956, **20** (4 part 3): 3-18, bibl. 24, illus.

In 30 cultivated varieties and the wild apricot the fruit flesh averaged 92·5% of the whole fruit, with a varietal range of 5·9%, and the kernel averaged 2·3%, varying from 1·3 to 4·1%. The amount of edible portion was greater than in the cherry only because the kernel is usable. The ratio of kernel to stone was similar to that in the almond. Larger fruits had relatively smaller stones; empty stones had an unfavourable effect and double kernels a favourable effect on fruit size.

3368. Wolf, J.
Beitrag zur Kenntnis der organischen Säuren der Süsskirsche und ihrer Veränderungen im Verlauf der Fruchtentwicklung. **(A contribution to our knowledge of the organic acids in the sweet cherry and of their changes in the course of fruit development.)**
Planta, 1958, **51**: 547-65, bibl. 26.

(1) Fruits of a sweet cherry variety thought to be Napoleon were examined chromatographically for organic acids. (2) The amount of total acid per fruit increases with fruit development, a fully ripe fruit of about 5·8 g. containing 0·79 m.eq. total acid which, calculated as malic acid, corresponds to about 0·9% of the total fruit weight, including the stone. (3) The not entirely uniform fraction "malic acid" predominates at all stages, but its proportion of the total acid rises in the course of development, reaching a value of about 85% (about 12 m.eq. per 100 g. fruit flesh) in ripe fruits. (4) In the early stages a fraction containing phosphoric acid and quinic acid makes up a remarkably high proportion of the total acid (27% at the earliest stage and about 4% in the fully ripe fruit). (5) The presence of other, partly unidentified, fractions is also discussed.—BundesforschAnst. Lebensmittelfrischhalt., Karlsruhe.

3369. Hulme, A. C., and Wooltorton, L. S. C.
The acid content of cherries and strawberries.
Chem. Ind. Lond., 1958, No. 22, p. 659, bibl. 4.

In the cherry variety Early Rivers the main acid present is malic, but there are also appreciable quantities of citric and quinic acids and small amounts of other acids including shikimic and succinic acids. When ripe cherries are stored the total acid content tends to rise during the first few days, the proportional increases being most marked in the case of quinic and shikimic acids. In the strawberry variety Royal Sovereign citric is the dominant acid, although malic is also present in considerable quantity and there are smaller amounts of quinic, succinic and other acids. In contrast to cherries all the acids in strawberries, except quinic, declined from the outset of storage.—Ditton Lab., D.S.I.R., Maidstone, Kent.

3370. Akune, S., Koga, K., and Fukunaga, T.
The peculiarities of the chemical content of mulberry leaves (variety, Okinawa) in early winter. [Japanese, with English summary ½ p.]
Bull. Fac. Agric. Kagoshima Univ., 1957, No. 6, pp. 75-81, bibl. 12.

Leaves suitable for rearing silkworms were obtained in early winter from Okinawa mulberry but not from Rosō, Ichinose or Kokusō No. 21. It was found that the chemical composition of Okinawa leaves in early winter is the same as that of other varieties in spring and autumn, except that the former contain more reducing sugars and less pectin. J.R.L.

3371. Whitaker, J. R.
The ficin content of figs and fig latex.
Proc. 12th annu. Res. Conf. Calif. Fig Inst., 1958, pp. 4-9.

Determinations were made of the content of ficin, a proteolytic enzyme, in the latex from 20 fig varieties and in the fruit from 25 varieties. Only the outer layer of the fruit was found to contain appreciable amounts; the seeds had very little. More variation was found in the ficin content of the figs than in that of the latex of different varieties. On a weight basis the latex contained 30–50 times more ficin than the fruit. The ficin content of the fruit increased as the fruit matured, but decreased during the final ripening stages; some, however, remained, and a sun-dried fig was found to contain the equivalent of 16–17 mg. commercial ficin. Ficin is stated to have the necessary properties for use in meat tenderization, clarifying beverages, bating of hides, cheese making and certain medicinal uses. J.R.L.

Harvesting and packing.

(*See also* 3285q, 3287, 3400c, l.)

3372. Poapst, P. A.
Maturity assessment in McIntosh.
From abstract in *Rep. Canad. Cttee Fruit Veg. Pres. for 1957*, 1958, pp. 6-7.

At Ottawa, it was observed that complete dissolution of starch preceded McIntosh fruit drop when prevailing temperatures averaged 49° F. or less. On the other hand, drop preceded starch disappearance at the rate of one day per every degree difference in average temperature over 49° F.; for example, in a season when temperature was averaging 63° F. mean drop preceded complete starch disappearance by two weeks. The above information when related to field tests indicated that a condition of mean drop would occur at a starch index as low as 6 during warm seasons and as high as 7·2 during cool seasons when testing picked fruit. Prior indication of approaching drop may be obtained by testing windfalls which have fallen within a few hours of apples that "touch off" the tree. [See also *H.A.*, 28: 153.]—Centr. exp. Fm, Ottawa.

3373. ANON.
Grower develops own system of bulk picking and handling of apples.
Dec. Fruit Gr, 1958, **8**: 120-2, illus.

Two boxes, 5 ft×5 ft×20 in., lined with lino and carrying 1,200 lb. of apples each, are transported to and from the orchard on a low-loading trailer and fork-lifted to the grader in the packing shed.

3374. NYHLÉN, Å.
Emballage- och transport-försök med äpple. **(Studies on packing and transporting apples.)** [English summary 1¼ pp.]
Sver. pomol. Fören. Årsskr. 1957, pp. 105-22, illus.
Wellpappemballage kontra trälådor. **(Fibreboard boxes versus wooden boxes.)**
Fruktodlaren, 1957, **28**: 63-4.

Bruising of apples during transport was compared in wooden and in fibreboard boxes, and using several types of padding. Fruit from undamaged boxes only was assessed for bruising. The level of fruit injury was much lower in fibreboard boxes, especially the telescope box type (385×285×235 mm.), than in wooden boxes. Double-face fibreboard was the most effective in reducing bruise damage, and paper wool was least effective. Bruising was lower with a tight pack than with a loose one.

3375. DE BEAUX, S. A.
Containers.
Citrus News, 1957, **33**: 127, 129.

Trial shipments of apples in cartons in steel mesh crates gave promising results but evoked some criticism. Tray packs were insufficiently strong but cell pack cartons were satisfactory. Uneven grading and slack packing were the main causes of handling injury.

3376. (MILBURN, F.)
New pine box costs less than carton.
Bett. Fruit, 1958, **53** (1): 13-14, illus.

The Chelan Tray Pack box, manufactured in Wenatchee, is the first all-wood apple box designed to hold standard apple trays. It will ship under the same weight standards as the fibreboard cartons and is cheaper than the latter. It can be used as a field or picking lug if desired.

3377. MITCHELL, F. G.
Pears. New packing method.
Amer. Fruit Gr, 1958, **78** (8): 18, illus.

Mechanical filling of cartons, followed by vibration to settle the fruit before padding and stapling under pressure, has given a tight pack of pears, which has travelled successfully across America. Pears packed mechanically in cartons arrived in better condition than pears packed in standard wooden boxes by hand.—Univ. Calif., Davis.

3378. MONAHAN, [W. J.].
Cling growers turn to bins.
West. Fruit Gr, 1958, **12** (6): 23-4, illus.

A system is described in which peach pickers fill orchard bins, 3 ft×3 ft×3 ft, which are transported to an orchard sizing and grading machine. The fruit is then delivered in similar sized bins to the cannery.

3379. DALRYMPLE, D. G.
Fruit-grower experience with "pick-it-yourself".
Prelim. [*Publ.*] *agric. Ext. Serv. Univ. Connect.*, 1957, pp. 11, bibl. 4.

Observations on marketing by "pick-it-yourself" methods (allowing the public to pick their own fruit) were limited to one season and to a few growers. In the case of highly perishable and easily harvested crops such as strawberries, raspberries, peaches, and possibly cherries, the success of the scheme was very encouraging.

3380. (WHITTENBERGER, R. T., AND HILLS, C. H.)
Cherry harvesting made easier.
Agric. Res. Wash., 1958, **7** (1): 7, illus.

Dropping cherries into nets suspended below the trees increased the rate of hand picking by 36%. Bruising was only slight and the fruit kept well for a week at 35° F. Tree shakers enabled harvesting to be done nearly 10 times more quickly than by pail picking. Some bruising occurred and cull cherries tended to fall first. Rapid cooling in ice water greatly retarded spoilage and scald development.

3381. LEVIN, J. H., AND HANSEN, C. M.
Multiple purpose tanks for Michigan cherry growers.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 955-9, bibl. 2, illus.

A suitable design for combining bulk handling and other uses such as carrying water to sprayers and applying liquid fertilizer.

3382. ANON.
New machine harvests prunes efficiently.
Agric. Res. Wash., 1958, **6** (12): 14, illus.

In this machine the fallen prunes are picked up between 2 soft rubber rollers and passed to a conveyor belt. It is self-propelled, handled by 1 man, and harvests at the rate of 1,000 lb. per hour from a 20-in. swath.

3383. SHULTIS, A., FISKE, J. N., AND ANDERSON, J. W.
Prune harvesting cost studies.
Calif. Agric., 1958, **12** (7): 2, 6, illus.

The costs of 3 methods of prune picking were compared in several orchards, viz. by hand, with catching frames and by machine. The use of a catching frame increased worker output per hour, and fruit quality was improved. Total harvesting costs per ton were $10.76 with the machine, $12.91 with frames and $14.35 by hand.—Univ. Calif., Berkeley.

3384. ANON.
Progress in mechanical harvesting of prunes.
West. Fruit Gr, 1958, **12** (6): 13-15, illus.

Boom tree shakers are being increasingly used and can be worked more quickly and cheaply than cable shakers. Catching frames are in use but present some difficulties. Mechanized picking machines are in an experimental stage and difficulty is experienced in dealing with trash and clods.

3385. Fisher, D. V., and Porritt, S. W.
Prune package cooling experiment.
From abstract in *Rep. Canad. Cttee Fruit Veg. Pres. for 1957*, 1958, p. 2.

Cardboard containers for packing prunes were found to have a slightly slower cooling rate than conventional packs in wooden crates, even when properly spaced.—Exp. Fm, Summerland, B.C.

3386. Nyhlén, Å.
Wellpapplådor som plommonemballage. **(Fibreboard boxes for plums.)** [English summary ¾ p.]
Sver. pomol. Fören. Årsskr. 1957, pp. 123-34, illus.

Damage to plums during shipping was compared in chips and in 4 types of fibreboard box. In all packs fruit injury was low, but it was slightly less in boxes than in chips. When high-quality fibreboard was used fruits were not crushed and were only slightly bruised.

3387. Warner, R. M.
Mechanical harvesting of figs, 1957.
Proc. 12th annu. Res. conf. Calif. Fig Inst., 1958, pp. 10-12.

From experiences during the last 2 seasons the author concludes that a grower who prepares the soil and makes other adjustments in the cultural practices in his orchards so that he can pick the figs mechanically would break even on his picking costs the first season and reduce his costs by about 50% after the second or third season. J.R.L.

Storage.

(*See also* 3285v, 3400k, m, 3497.)

3388. Ildis, P., and d'Ersu, A. P.
Entreposage frigorifique des pommes et des poires récoltées au Maroc. **(Cold storage of apples and pears harvested in Morocco.)**
Fruits et Prim., 1958, **28** (295): 8-24, bibl. 8, illus.

Apple varieties Belle de Boskoop and Reinette Blanche du Canada were stored at +3° C., Golden Delicious, Red and Starking Delicious, Stayman Winesap and Winter Banana at −1° C., Jonathan at +3° C., at 0° and at decreasing temperatures (4 weeks at +3°, 4 weeks at 1·5° and 0° thereafter). Pear varieties Williams', Conference, Beurré Clairgeau and Duc de Bordeaux were stored at −1° C. The behaviour of the fruit in the cold chamber was normal, conforming to that anticipated and of a satisfactory duration. Graphs are given which show the changes in weight loss, starch content, firmness, number of open lenticels, acidity and refractive index of juice.

3389. Fisher, D. V., and Porritt, S. W.
Softening of McIntosh held from harvest at 70° and 32° F.
From abstract in *Rep. Canad. Cttee Fruit Veg. Pres. for 1957*, 1958, p. 4.

Flesh of McIntosh apples harvested at a firmness of 15·5 lb. softened at the rate of about 1·0 lb. per day during one week at 70° F. Similar fruit stored promptly at 32° F. softened fairly consistently to a firmness of 10·0 lb. in 80 days and then remained relatively constant.—Exp. Fm, Summerland, B.C.

3390. Eggert, F. P.
Stowage of apples in storage in relation to their cooling.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 32-5, bibl. 7.

Fruit in eastern apple crates cooled as rapidly when piled in tight stacks with the long axis at right angles to air flow as when a 3½-inch space was left between tiers of crates. There was no difference between the rates of cooling of fruit in tightly stacked eastern crates, whether the long axis of the crate was placed at right angles to, or parallel with air flow in the room. Fruit in cell-pack cartons cooled much more slowly than did fruit in eastern crates. [From author's summary.—For a shorter account, see *H.A.*, 28: 2226.]—Me agric. Exp. Stat., Orono.

3391. Zahradnik, J. W., Southwick, F. W., and Fore, J. M.
Internal atmosphere movement in CA apple storage.
Agric. Engng St. Joseph, Mich., 1958, **39**: 288-9, bibl. 2.

The behaviour of 2 similar controlled-atmosphere stores equipped with breather bags is described for a whole storage season. A 0·1 in. (water) pressure difference across the walls caused continuous air movement through the store and the leakage, being greater than the oxygen consumption of the fruit, raised the oxygen level. The pressure differential resulted in deflation of the breather bag and it is concluded that gas storage rooms must be designed for proper circulation and cooling without the use of high atmospheric velocities.

3392. Phillips, W. R., and Poapst, P. A.
Controlled atmosphere storage.
From abstract in *Rep. Canad. Cttee Fruit Veg. Pres. for 1957*, 1958, pp. 4-6.

(*a*) One year's experimental work showed the desirability of constructing really gas-tight linings for gas storage chambers. (*b*) Keeping apples in a controlled atmosphere resulted in poor germination of the seeds. (*c*) Di-phenyl amine at 1,000 p.p.m. controlled scald of Cortland apples, selected for their susceptibility to the disorder, in gas storage.—Centr. exp. Fm, Ottawa.

3393. Smock, R. M., and Blanpied, G. D.
A comparison of controlled atmosphere storage and film liners for the storage of apples.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 36-44, bibl. 5.

Sealed polyethylene liners were unreliable for the storage of unprecooled fruit without fungicidal treatment. In some cases off-flavour from O_2 deficiency, in others CO_2 injury occurred. Decay was often increased with both sealed and unsealed liners. Scald was usually increased with unsealed liners and was often increased with sealed liners. Consistently low O_2 level usually decreased scald. While controlled atmosphere storage is not suitable for all varieties of apple at present, it was considered safer for lengthening storage life than the use of sealed liners.—Cornell Univ., N.Y.

3394. Phillips, W. R.
Crop size in relation to breakdown in McIntosh.
From abstract in *Rep. Canad. Cttee Fruit Veg. Pres. for 1957*, 1958, p. 7.

Trees having 30 to 50% normal crop had a breakdown index in storage ranging from 20 to 36. This was reduced to an index of 10 with a crop over 50%. Normal or full crop appeared to reduce the breakdown to nil.—Centr. exp. Fm, Ottawa.

3395. Jones, A. H., and Yates, A. R.
Effect of irradiation on molds and yeasts on apples.
From abstract in *Rep. Canad. Cttee Fruit Veg. Pres. for 1957*, 1958, p. 9.

Apples packed in polythene bags and enclosed in polythene-lined cardboard boxes were exposed to gamma radiation, the dosages ranging from 50,000 to 500,000 reps. Fruits that had been artificially inoculated showed a marked reduction in moulds and yeasts after irradiation with the 200,000, 300,000 and 500,000 reps but the treatment also caused a breakdown of the skin tissue.—Bact. Div., Sci. Serv., Ottawa.

3396. Woodruff, R. E., and Crandall, P. C.
The effect of several respiratory inhibitors on apples.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 26-31, bibl. 11, illus.

On the basis of respiratory data and condition of fruit after 3 weeks' ripening at 70° F., Na-malonate (0·001 M), 3-indolepropionic acid (0·0005 M), hippuric acid (0·0005 M) and benzimidazole (0·001 M and 0·0005 M) were the most effective of 18 chemicals tested for their ability to reduce respiratory rate.—St. Coll. Wash., Pullman.

3397. (McClure, T. T.)
Hydrocooled peaches also need fungicide.
Agric. Mktg, from abstr. in *Bett. Fruit*, 1958, **53** (1): 16.

The addition of chlorine or Dowicide A to the iced water used for hydrocooling peaches gave good disease control. A solution containing 200 p.p.m. chlorine reduced brown rot by 29% and rhizopus rot by 4%. A 0·1% solution of Dowicide A reduced brown rot by 64% and rhizopus rot by 17%. When this treatment was followed by holding at 40° F. for 5 days, rot reductions were 91% and 47% respectively. —U.S. Dep. Agric., Beltsville, Md.

3398. Eaks, I. L., Eckert, J. W., and Roistacher, C. N.
Ammonia gas fumigation for control of rhizopus rot on peaches.
Plant Dis. Reptr, 1958, **42**: 846-8, bibl. 4.
Rhizopus rot on peaches.
Calif. Agric., 1958, **12** (7): 7, 14, illus.

Ammonia gas fumigation of peaches immediately after harvest was effective in controlling rot caused by *Rhizopus nigricans*. With the severe inoculation procedures used, comparatively high ambient concentrations were required for good control. Under conditions of less severe inoculation it is probable that effective control could be obtained without fruit injury by two 6-hour fumigations of an average ammonia concentration of about 250 p.p.m. Fumigation must be accompanied by sampling to determine the ambient ammonia concentration in the chamber. Commercial recommendations cannot be made without further testing.

The second article is a popular account.—Citrus Exp. Stat., Riverside, Calif.

3399. Maxie, E. C., Robinson, B. J., and Catlin, P. B.
Effect of various oxygen concentrations on the respiration of Wickson plum fruit and fruit tissues.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 145-56, bibl. 31.

At 20° C. the respiration of fruit and fruit slices was proportional to the O_2 concentration from 0 to 21% (air), a smaller transient increase occurring at concentrations from 21 to 40%. The terminal oxidase in this plum was thought to be an iron-containing enzyme, probably cytochrome oxidase, and, as an increase of temperature from 20° to 35° C. did not affect respiration, to be the same at all the temperatures studied. High O_2 concentrations induced a climacteric rise in respiration, but had no effect when the climacteric had been previously induced by ethylene.—Univ. Calif., Davis.

Noted.

3400.

a Akune, S., Koga, K., and Fukunaga, T.
On the coefficient of availability of mulberry leaves. [Japanese, with English summary ½ p.]
Bull. Fac. Agric. Kagoshima Univ., 1957, No. 6, pp. 82-8, bibl. 5.
Suitability of Rosō leaves from various positions on the stem for silkworm rearing.

b Anon.
Dual purpose apricots tap extra market.
Agric. Res. Wash., 1958, **6** (11): 12, illus.
Blenril and Earliril are winter-hardy, early, productive and bear attractive fruit suitable for canning and shipping.

c Anon.
Bulk handling of fruit: possibilities and problems.
Dec. Fruit Gr, 1958, **8**: 140-1, illus.
For apples.

d Bailey, F. L.
Development of fruitgrowing in the Auckland district.
N.Z. J. Agric., 1958, **96**: 583-91, bibl. 5, illus.

e Bartram, R. D.
Thinning for profit.
West. Fruit Gr, 1958, **12** (5): 21-3, illus.
Size thinning to supplement chemical spraying improves marketable yield per acre with Winesap apples.

f Blodgett, E. C., and Aichele, M. D.
The pear rootstock puzzle.
West. Fruit Gr, 1958, **12** (7): 21-4.
The various spp. and types are described with special reference to disease resistance.

g BRADT, O. A.
Peach varieties that set crops under adverse conditions.
Fruit Var. hort. Dig., 1958, **12**: 51-2, illus.
Five varieties which yielded well after a late Canadian spring.

h (BURBANK, W.)
Hydraulic platform makes pruning easier.
West. Fruit Gr, 1958, **12** (5): 15, illus.
Tractor drawn platform, 20 ft × 10 ft, and rising from 40 in. to 7 ft.

i DANILOV, A. D., AND SINEL'ŠČIKOV, R. G.
The wild cherry in the forests of northern Osetia. [Russian.]
Bot. Žurnal, 1958, **43**: 262-6, bibl. 1.
Observations by foresters on the light- and dark-barked forms of *Cerasus* [*Prunus*] *avium* showed the light-barked form to be the more vigorous.

j DEPARTMENT OF AGRICULTURE, DUBLIN.
Varieties of fruit suitable for cultivation in Ireland.
Leafl. Dep. Agric. Dublin **64,** 1956, pp. 12.
Annotated lists of top and small fruit varieties.

k DUPAIGNE, P.
Le traitement des fruits par des radiations ionisantes. **(The treatment of fruit by ionizing irradiation.)**
Fruits d'Outre Mer, 1958, **13**: 269-80, bibl. 73, illus.
A review, dealing individually with 21 kinds of deciduous and tropical fruits.

l FISHER, D. V., AND PORRITT, S. W.
Bulk handling of McIntosh apples.
From abstract in *Rep. Canad. Cttee Fruit Veg. Pres.* for *1957*, 1958, pp. 1-2.

m FISHER, D. V., AND PORRITT, S. W.
Storage of McIntosh and Spartan apples in controlled atmospheres.
From abstract in *Rep. Canad. Cttee Fruit Veg. Pres. for 1957*, 1958, p. 4.
Core flush controlled, but scald a continuing hazard.

n FREW, S.
History of fruitgrowing in Canterbury.
N.Z. J. Agric., 1958, **96**: 473-85, illus.
A survey from 1850 to the present time.

o FUKUSHIMA, S.
Hand pollination in apples. [Japanese.]
Ser. Aomori Apple Ass. **34,** [received 1958], pp. 44, illus.

p HONAN, N. D.
The marketing of fresh fruit and vegetables in Melbourne.
Quart. Rev. agric. Econ., Canberra, 1958, **11**: 9-13.
Market organization.

q HOUGH, L. F., AND BAILEY, C. H.
Elbertita—a dwarf peach for home gardens.
Fruit Var. hort. Dig., 1958, **12**: 60.
Elbertita—a new dwarf peach for the home grounds.
N.J. Agric., 1958, **40** (3): 9, illus.

r KILPATRICK, D. T., HARRIS, G., AND STEED, J. N.
Propagating deciduous fruit trees.
J. Dep. Agric. S. Aust., 1958, **61**: 504-8, 529, illus.
Nursery management, care of stocks, scion selection, budding and grafting.

s KITSON, J. A.
Color standards for sweet cherries.
From abstract in *Rep. Canad. Cttee Fruit Veg. Pres. for 1957*, 1958, p. 17.
For 3 stages of maturity of Van, Bing and Lambert cherries.

t KON, K., YAMADA, M., AND KIMURA, C.
Graft injury in apple trees. I. The real state of the injury which occurs in Aomori. [Japanese.]
Misc. Pub. Aomori Apple Exp. Stat. **10,** 1957, pp. 6, illus.

u KONSTANTINOV, A. V.
Apospory in the apple tree. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **120**: 1147-50, bibl. 11, illus.

v LAKON, G., AND BULAT, H.
Die Feststellung der Keimfähigkeit der Rosaceensamen nach dem topographischen Tetrazolium-Verfahren. **(The determination of the germination capacity of Rosaceae seed according to the topographic tetrazolium method.)**
Saatgut-Wirtsch., 1958, **10**: 166-9, 192-4, bibl. 9, illus.
Comprises Pomoideae, Prunoideae and Rosoideae.

w LE GLORU, P.
La taille du pêcher dans la vallée du Rhône et en Provence. **(Peach pruning in the Rhone valley and in Provence.)**
Ann. Soc. nat. Hort. Paris, 1958, **4**: 419-23, illus.
Advantages and disadvantages of the standard, the American and intermediate methods.

x MINISTÈRE DE L'AGRICULTURE, QUÉBEC.
Recensement des pommiers, production et vente de pommes dans la Province de Québec. Volume 1.—Données statistiques. **(Census of apple trees, production and sale of apples in Quebec Province. Vol. 1. Statistical data.)**
Quebec, 1958, pp. 47, cyclostyled.

y MINISTRY OF AGRICULTURE, LONDON.
The pollination of apples and pears.
Adv. Leafl. Minist. Agric. Lond. **377,** revised 1958, pp. 6.
Choice of pollinators, flowering periods and planting plans.

z MOWRY, J. B.
Illinois peach varieties and their place in the national peach marketing picture.
Trans. Ill. St. hort. Soc., 1957, 1958, **91**: 96-107, bibl. 13.
An analysis of production with recommendations for future plantings.

3401.

a Murawski, H., and Wieloch, E.
Zur Eignung von *Malus*-Artbastarden für die Obstverwertung. **(The use of *Malus* species hybrids for processing.)**
Dtsch. Gartenb., 1957, **4**: 260-2, bibl. 3, illus.
For juice, cider, canning and jam.

b Plock, H.
Über die Verträglich- bzw. Unverträglichkeit verschiedener Aprikosensorten in der Baumschule und im Obstbau. **(Compatibility and incompatibility of several apricot varieties in the nursery and in the field.)**
Dtsch. Baumsch., 1958, **10**: 189-91, 193.
Results using 27 varieties, 7 rootstocks and 6 stocks plus interstocks are tabulated. [See also *H.A.*, 28, 2239a.]

c Proebsting, E. L.
Fertilizers and covercrops for California orchards.
Circ. Calif. agric. Exp. Stat. Ext. Serv. **466,** 1958, pp. 19, illus.
Mineral deficiency symptoms and advice on fertilizer dressings and cover cropping.

d Raw, F., and Stephenson, J. W.
Earthworm populations in orchards.
A.R. Rothamsted exp. Stat. 1957, 1958, p. 162.
In 5 apple orchards receiving different manurial and fungicidal treatments.

e Rjadnova, I. M.
Seedlings of cultivated peach varieties in the Kuban. [Russian.]
Agrobiologija, 1958, No. 2, pp. 42-5.
Introduced peach varieties were found unsuitable because of low frost resistance.

f (Schultz, J. H., and others.)
How to train a peach tree.
Agric. Res. Wash., 1958, **6** (11): 12-13, illus.
The best results were from heading at 33 in. and leaving not more than 4 leaders.

g Shibukawa, D.
Pruning of apple trees. [Japanese.]
Ser. Aomori Apple Ass. **33,** [received 1958], pp. 129, illus.

h Terpó, A.
A *Pyrus* genus félkultúr és kultúr alakjainak természetes előfordulásai. **(The occurrence in nature of semi-cultivated and cultivated forms of the genus *Pyrus*.)**
Kert. és szől. Főisk. Évkönyve, 1956, No. 6, pp. 30, from abstr. in *Hung. agric. Rev.*, 1957, **6** (4), Abstr. 278.
Common wild pears, garden escapes and their hybrids.

i Watanabe, T.
Substances in mulberry leaves which attract silkworm larvae (*Bombyx mori*).
Nature, 1958, **182**: 325-6, bibl. 7, illus.
β-γ-Hexenol and α-β-hexenal.

j Wolf, J.
Über das Vorkommen von Chlorogensäure und ihren Isomeren in Blättern von Steinobstbäumen. **(On the occurrence of chlorogenic acid and its isomers in leaves of stone fruit trees.)**
Naturwissenschaften, 1958, **45**: 130-1, bibl. 5.

k Zanotti, L.
Il ciliegio in Italia, con accenni alla situazione mondiale. **(Cherry growing in Italy, with comments on the world situation.)**
Ital. agric., 1958, **95**: 414-29, illus.
Varieties, production, uses, rootstocks, manuring, packing containers.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 3243, 3320, 3321, 3340, 3458c, d, f, g, k, l, n, q, r, t, w, 3459b, f, g, 4179, 4181.)

3402. Scottish Agricultural Improvement Council, Fruit Trials Committee.
Report on fruit trials in Scotland 1949-1956, 1957, pp. 38.
A summary of results of raspberry, strawberry and black currant trials in Scotland in the years 1953-1957.
Leafl. Scot. agric. Improve. Coun. Fruit Trials Cttee **1**, 1958, pp. 7.

The trials were started in 1951-52 and are now established at 4 sites, Auchincruive, Craibstone, Mylnefield and Liberton, to observe the behaviour of varieties in different areas. Detailed results are given of variety trials with raspberries, strawberries and black currants [see *H.A.*, 25: 2517 and 27: 241q], and brief mention is made of a plum variety trial started in 1954. The leaflet contains a slightly abbreviated account of the small fruit trials.

3403. Dodge, J. C., and Snyder, J. C.
Horticulture. Small fruits.
Wash. St. Res. Progr., 1958, No. 9, pp. 3-6.

The following results are included in summaries of research projects: *Strawberries:* yields were increased by using the double-row system; Phaltan used for fruit rot control increased yields by 3·3 tons per acre; practically the same yields were obtained after application of 100 lb. per acre P_2O as when 300 lb. per acre were used; with Marshall plants stands were in most cases better from cold-stored than from freshly-dug plants, but with Northwest plants differences were small. *Raspberries:* black plastic mulch nearly doubled the length of cane growth of Sumner raspberries in the first season. *Cranberries:* gibberellic acid, IPC emulsion and Duraset treatments reduced fruit set and berry size; some response was observed to Fe, Zn, Mg and Mn; sulphate of ammonia applied in the spring was the most effective of N treatments; yields were improved by the addition of 80–120 lb. P and 100–200 lb. K_2O per acre. *Vines:* in nutritional studies K content of fruits from high-yielding vines was lower than from low-yielding vines; soluble solids contents of fruits were not affected by high yields; a cover crop of creeping red fescue caused earlier leaf yellowing than alfalfa, and both cover crops resulted in low N, Ca and Mg and high K contents in petioles.

3404. Porpáczy, A.
A bogyósgyümölcsűek és héjasok terén végzett kutatások eredményei és feladatai. **(Results and future trends of research on small fruits and nuts.)**
Magyar tud. Akad. Közl., 1957, **12** (1-4): 115-30, from abstr. in *Hung. agric. Rev.*, 1958, 7 (1), Abstr. 20.

The present aims of small fruit breeding in Hungary are the production of high-yielding varieties resistant to winter injury, drought and diseases [see also *H.A.*, 28: 70]. Progress in hybridization of strawberry and raspberry varieties is reported. An early strawberry variety which gave high yields in its first year is considered to be promising. Three new raspberry hybrids of suitable canning quality have been selected, and are propagated by layers. Varietal trials are in progress with walnuts.

3405. Harston, C. B., Morrison, K. J., and Roché, B.
Agronomy.
Wash. St. Res. Progr., 1958, No. 3, pp. 8.

Soils. Potash rates up to 180 lb. [per acre] could be applied to runner beans in bands at sowing time without harmful effects. Seed treatment and foliage sprays of gibberellic acid did not improve vegetable yields. Spring applications of N reduced strawberry yields; K at 60 lb. per acre was satisfactory. Spring applications of 80 lb. N and 60 lb. K_2O per acre gave the best results with raspberries. Blackberries responded to N at rates up to 120 lb. per acre; applications in spring were better than in autumn. Phosphate applications of 120 lb. per acre gave the best blackberry yields. Blackberry yields from plants spaced at 8 ft. were higher than those at 18 ft, but the closer spacing was not profitable owing to extra labour requirement. *Weeds.* Sioux tomato plants treated when 4–6 in. high with 2,4-D at rates up to 100 p.p.m. showed no signs of injury. Good annual weed control was obtained in direct-seeded cabbage and cauliflower by CDEC. Chlorazin has shown promise for selective pre-emergence control in carrots. Neburon, 4-(2,4-DB) and simazin caused little injury to strawberry plants, while controlling a wide range of annual weeds. Diuron has given good results in ornamental bulb crops, and simazin has been effective in 5 evergreen nursery species.

3406. Vitkovskij, V. L.
Small fruits on the Kola peninsula. [Russian.]
Sad i Ogorod, 1958, No. 6, pp. 54-7, illus.

Notes are given on wild berries and their importance. Of cultivated kinds black and red currants, raspberry and strawberry are of interest. At the Polar Research Station, Hibin, the most suitable commercial crop was found to be the Igarka form of the Siberian subspecies of black currant, which is exceptionally hardy, commencing growth at an average daily temperature of 1–3° C., before the complete disappearance of snow. Suitable varieties of red currant, strawberry, raspberry and other black currants, including some promising locally developed forms of the last 2 named, are described.

3407. Gupta, J. C., Gupta, D. R., and Gupta, S. C.
Papyrographic characterization of sugars in some edible wild fruits of Naini Tal.
Sci. and Cult., 1958, **23**: 480-1, bibl. 2.

Sucrose, glucose and fructose were found in *Rubus lasiocarpus*, glucose and fructose in *Myrica nagi* and *Berberis lycium*, and glucose only in *Crataegus crenulata*.—D.S.B. Govt Coll., Naini Tal, U.P.

3408. Salmanov, A. S.
Foliar nutrition of black currant. [Russian.]
Sad i Ogorod, 1958, No. 6, pp. 59-61.

The results of several experiments are given showing an average of 20% increase in yield from foliar nutrition of black currant. When P and K were sprayed at the end of August, to study their effect on the initiation and differentiation of flower buds, the number of flowers in the bud was increased by 38·6–69%. The best results were obtained with superphosphate and P+K fertilizers; potassium chloride was less satisfactory.

3409. Haenel, H., and Wegner, R.
Contents of B vitamins in different varieties of black currant.
Ernährungsforschung, 1957, **2**: 800-1, from abstr. in *J. Sci. Food Agric.*, 1958, **9**: ii-35.

No significant differences were found in the contents of vitamins B_1, B_2, B_6 and nicotinic acid between 3 varieties of black currant. The values found for B_2 were approximately double those reported in the literature.

3410. Klämbt, H. D.
Untersuchungen über die Befruchtungsverhältnisse bei Schwarzen und Roten Johannisbeeren. **(Studies on pollination behaviour in black and red currants.)**
Gartenbauwiss., 1958, **23**: 9-28, bibl. 20.

Partial self-sterility occurred in all 4 red currant varieties, and in 2 of the 4 black currant varieties studied. With open pollination black currants were in general self-pollinated, while red currants were cross-pollinated. Partial self-sterility is characterized by lower seed number per berry after self-pollination as compared with cross-pollination, and also by slower seed development. It is considered that the slower seed development after self-pollination is primarily responsible for running off.—Inst. Obstb., Univ. Bonn.

3411. Vitkovskij, V. L.
Development of fasciation in top- and small-fruit plants. [Russian.]
Doklady Akad. Nauk. S.S.S.R., 1958, **119**: 816-18, bibl. 3, illus.

The morphology of stem fasciation is discussed. Fasciation appears to be more frequent under unfavourable environmental conditions, as was found in the case of West European black currants grown in the Murmansk region.

3412. Ballinger, W. E., and others.
Production in Michigan blueberry plantations in relation to nutrient-element content of the fruiting-shoot leaves and soil.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 896-905, bibl. 26.

Approximately 55 blueberry plantings were used for the survey. Soil samples were analysed for cation exchange capacity, exchangeable Ca, Mg, and K, and pH. Yield records were taken on 33 of these plantings. Analyses were made of fruiting-shoot leaves for N, P, K, Ca, Mg, Mn, Fe, B, Cu and Zn. The survey revealed that N was directly proportional to yield when below a maximum of 2·1% dry weight in the fruiting-shoot leaves. Above 2·1% N there was a decrease in yield. The percentage of the soil cation exchange capacity occupied by Ca appeared to affect the vigour of the blueberry plant. Quantities above 10% were reflected in extremely poor growth. There were some indications that the Mg content (% dry weight) of the leaves was related to yield, but may be only of minor influence. [From authors' summary.]

3413. Ballinger, W. E., and others.
Relationship between nutrient-element content of blueberry foliage and fruit.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 906-11, bibl. 5.

Samples of fruiting-shoot leaves, sucker leaves and fruit were collected from 33 blueberry plots in south-western Michigan. Fruiting-shoot leaves were similar to sucker leaves in regard to N, P, Ca, Mn, Cu, B and Zn. Fruiting-shoot leaves contained less K but more Mg and Fe than sucker-shoot leaves. Fruit analysis for all nutrient-elements except K was below that found for the leaf samples. Coefficients of variation calculated for each nutrient indicated that fruiting-shoot leaves would be more desirable for determining the nutritional status of blueberry plants. Linear correlation studies showed a significant multiple correlation between the 3 samples for Mn but not for the other nutrients. The composition of fruiting-shoot leaves showed a better relationship to sucker leaves than to fruit composition. Sucker leaves showed a better relationship to fruit composition than to fruiting-shoot leaves. No significant correlations were found for Cu and Zn. Analyses of leaves from bushes where leaves exhibited deficiency symptoms revealed that symptoms may appear when Mn is below 0·0031%, Fe is below 0·0060% and Mg less than 0·11%. [Authors' summary.]

3414. Ballinger, W. E., Bell, H. K., and Kenworthy, A. L.
Soluble solids in blueberry fruit in relation to yield and nitrogen content of fruiting-shoot leaves.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 912-14, bibl. 2.

Soluble solids readings of highbush blueberry fruit were taken during the 1955 harvest. These indicated that the range of soluble solids in blueberry fruit was from approximately 10 to 18%. Total yield in pounds of blueberries per bush and percent soluble solids appeared to be highly correlated, with a correlation coefficient of —0·701. Soluble solids and percent N in the fruiting-shoot leaves were also related, with a correlation coefficient of —0·580, which was also highly significant. The data suggest that a nitrogen-carbohydrate relationship may be of importance in the blueberry plant; that an excessively high N content or a large yield of fruit may effect a decrease in soluble solids content of the blueberry fruit. Conversely, an abnormally low content of N or a small yield may contribute toward a high soluble solids content of blueberry fruit. [Authors' summary.]

3415. Beattie, J. R., and Demoranville, I. E.
A fresh cranberry market survey.
Bull. Mass. agric. Exp. Stat. **501**, 1958, pp. 12.

In a survey of market quality of cranberries in 1955, 3·7% of packing house and 23·2% of retail samples were unusable owing mostly to fruit decay. Figures for bruising were 16·0% and 59·4%. Complete refrigeration in retail stores reduced losses by 50%.

3416. Vitkovskij, V. L.
The development of floral organs in *Grossularia* Mill. [Russian.]
Bot. Žurnal, 1958, **43**: 277-83, bibl. 3, illus.

A 3-year study was conducted in the Leningrad province on flower bud development in the European gooseberry (*Grossularia reclinata* var. *vulgare*), 9 of its varieties, 6 varieties of American species, *G. divaricata* and the interspecific hybrid *G. succirubra*. The development in the axillary buds of annual shoots, from the differentiation of the growing point to flowering, is divided into 6 phases which are described, illustrated and their durations tabulated. The total duration of bud development varied from 260 to 275 days; it was shortest in the American varieties and in buds on the southern side of the bush. Bud differentiation on spurs started a few days later but development was completed 5–10 days sooner than on the annual shoots.

3417. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med beskaering af stikkelsbaerbuske. (Foreløbig meddelelse.) **(Studies on gooseberry pruning (preliminary report).)**
Tidsskr. Planteavl, 1958, **62**: 351-4.

The effects of 4 levels of pruning were compared on 2 gooseberry varieties. Yields were highest with the lightest pruning, but weight of individual berries increased with the severity of pruning. There was little difference in ease of picking between the pruning methods. Spur-pruning took the longest time, but the most wood was removed in severe pruning. It is concluded that the severe methods of pruning are not economic.

3418. Hill, R. G., Jr.
Fruit development of the red raspberry and its relation to nitrogen treatment.
Res. Bull. Ohio agric. Exp. Stat. **803**, 1958, pp. 35, bibl. 11, illus.

All parts of the fruit showed a retardation of growth during hardening of the endocarp. Addition of 0, 50 or 100 lb. of N per acre, as either nitrate or sulphate of ammonia, had no significant effect during a dry season on development or maturity of the fruit. Titratable acid and hydrogen ion concentration in the fruit increased uniformly until ripening began and decreased slightly during ripening.

3419. Potapov, S. P., and Nitočkina, A. P.
Strawberry variety trials in the Moscow region. [Russian.]
Sad i Ogorod, 1958, No. 6, pp. 46-9, illus.

The 2 authors give results of 2 different trials, each of 5 years' duration, assessing yield, resistance to grey mould, hardiness, date of ripening and quality. The most suitable varieties for commercial and domestic planting are recommended. Cultural practices employed are outlined.

3420. Žukovskaja, A. A., and Sin'kova, Z. A.
Strawberry variety trials in the Leningrad region. [Russian.]
Sad i Ogorod, 1958, No. 6, pp. 50-2.

These trials to find strawberries suitable for the Leningrad region were similar to those described above [abstract 3419], and certain of the varieties are recommended in both.

3421. Günther, E.
Frühreife Erdbeeren nach Kreuzung mit *Fragaria platypetala* RYDB. **(Early-ripening strawberries from crosses with *Fragaria platypetala*.)**
Züchter, 1958, **28**: 144-6, bibl. 2, illus.

Hybrids between Müncheberger Frühe and *Fragaria platypetala* ripened a week earlier than Müncheberger Frühe. Yields from the hybrids were low.—Arndt-Univ., Greifswald.

3422. Bringhurst, R. S., and Voth, V.
Summer strawberry planting.
West. Fruit Gr, 1958, **12** (7): 14, illus.

Summer planting of strawberries is still experimental but promises to become a profitable standard practice in southern California owing to reduced maintenance costs. A small fruit crop is produced in the planting season, followed by runner production. The plants are dug in December or January and stored at 28° to 30° F. packed in polyethylene 1·5 mil. thick. Thicker film interferes with gas exchange. The timing of summer planting is important and depends on locality. The plants must be set early enough to allow for runner production in the establishment season.—Univ. Calif., Davis.

3423. Jonkers, H.
Accelerated flowering of strawberry seedlings. [Dutch summary ¼ p.]
Euphytica, 1958, **7**: 41-6, bibl. 5.

Germination of strawberry seeds was poor after cold treatment at 3–5° C. for 16 days. Seed treatment with 96% sulphuric acid resulted in more rapid germination and a higher germination percentage than in the untreated controls in the case of Jucunda and Deutsch Evern; Climax did not respond to treatment. Short-day treatment of seedlings with 3 trifoliate leaves did not induce flowering. Short-day treatment was effective with 5-leaved seedlings of Deutsch Evern, and 7-leaved seedlings of Climax and Jucunda. The life-cycle of strawberries was reduced from 18–24 months to 8–9 months by combined sulphuric acid treatment of seeds and short-day treatment of seedlings.—Lab. Tuinbouwpl., Wageningen.

3424. Smith, C. R.
A study of the inorganic nutrition of strawberries.
Diss. Abstr., 1957, **17**: 2757-8, being *Publ.* 22,552 of 92 pp.

The effect of various levels of P, K and Mg were studied in sand-culture experiments with Sparkle strawberries. Growth and leaf contents of P were significantly and directly related to P in the nutrient solution. Potassium levels of 39 p.p.m. and above in the nutrient solution were significantly and directly related to leaf K, fresh and dry weights of crowns, and fresh weight of roots. At 20 p.p.m. K, fresh and dry weights of petioles and crowns and fresh weight of roots were significantly reduced. Increasing K levels significantly reduced the percentage dry weight of leaf blades and petioles, but did not significantly affect that of crowns or roots. Leaf Mg varied directly with Mg levels in the nutrient solution; percentage dry weight of the petioles was significantly affected by nutrient Mg. At 30 p.p.m. Mg significantly reduced fresh and dry weights of leaf blades and crowns, fresh weight of roots and leaflet numbers. Chemical analysis showed that leaf K and Mg were directly related to K and Mg in the nutrient solution, whereas leaf Ca was inversely related to nutrient K and Mg. The only significant K and Mg interaction found in the growth data was in average weight per petiole.—Rutgers Univ.

3425. Loewus, F. A., and Jang, R.
The conversion of C^{14}-labeled sugars to L-ascorbic acid in ripening strawberries. II. Labeling patterns in the free sugars. III. Labeling patterns from berries administered pentose-1-C^{14}.
Loewus, F. A., Jang, R., and Seegmiller, C. G.
Idem. IV. A comparative study of D-galacturonic acid and L-ascorbic acid formation.
J. biol. Chem., 1958, **232**: 505-19, bibl. 37, 521-32, bibl. 47, and 533-41, bibl. 32.

Detached ripening strawberries were injected or stem-fed with various sugars labelled with C^{14}, and the labelling patterns found in the ascorbic acid and other carbohydrate components of the fruit were determined. The results described in the first two papers support the view that the ascorbic acid in the strawberry is derived from a metabolic pool of carbohydrate that is closely related to, and possibly identical with, glucose 6-phosphate. The third paper provides evidence that neither galacturonic acid nor its derivatives are involved as intermediates in ascorbic acid formation in the strawberry. [For part I see *H.A.*, 27: 1016.]—West. Utiliz. Res. Div., U.S.D.A., Albany, Calif.

3426. Smith, W. H.
The handling, precooling, transport and storage of strawberries and raspberries.
Misc. Pap. D.S.I.R. Food Invest. Lond., **10/58**, 1958, pp. 14.

Practical advice is given on improving soft fruit quality at the market by the use of refrigeration and CO_2 gas, which delay fruit development and reduce fungal rotting. Subjects discussed include cooling, transporting pre-cooled fruit, pre-cooled fruit on the market, refrigeration capacity, the use of CO_2 in large and small insulated containers, and length of storage period. There are 4 appendices to this leaflet which give experimental results on the reduction in fungal rotting after low temperature or CO_2 treatment, on their effects on quality in a commercial handling and transport trial, and on the effect of delays before precooling on subsequent quality.

Vines.

(*See also* 3228, 3285s, 3294, 3403, 3458a, b, e, h-j, o, p, s, u, v, x-z, 3459d, e, 3636, 4174, 4193.)

3427. Cosmo, I., and Polsinelli, M.
Lambruschi. (**Lambrusco grapevines.**) [English summary 5 lines.]
Ann. Sper. agrar., 1958, Vol. **12**, No. 2, Suppl. pp. cxv-clxi, bibl. 15, illus.

The Lambrusco vines are probably all derived from the wild *sylvestris* type of *Vitis vinifera* known in classical times. The 6 principal varieties, all dark fruited and used for wine making, are described in detail.

3428. Wagner, E.
Über spontane tetraploide Mutanten von *Vitis vinifera* L. (**Spontaneous tetraploid mutants of *Vitis vinifera*.**)
Vitis, 1958, **1**: 197-217, bibl. 24, illus.

Flower and berry characters of 48 mutants were studied. Germination percentage of pollen was lower than in diploid forms. All mutated forms show increases in berry size of 21–63%, and seed numbers were lower than in diploid forms. Differences in yields, wine quality and frost resistance were variable, but some mutants were promising.—BundesforschAnst. Rebenzücht., Geilweilerhof.

3429. Alleweldt, G., and Geisler, G.
Untersuchungen über die Zellsaftkonzentration bei Reben. I. Modifikabilität und Variabilität des osmotischen Wertes. (**Studies of cell sap concentration in vines. I. Modification and variability of osmotic value.**)
Vitis, 1958, **1**: 181-96, bibl. 39.

The highest osmotic values of cell sap occurred in fully-grown leaf blades. Values were less in vascular tissues, and in leaf bases, petioles and stems. In comparative varietal studies samples should be taken from laminae in the early morning. Osmotic values fluctuated throughout the day, and there were different varietal patterns. In general maximum values were reached about midday, with a second maximum in the early afternoon. Varietal differences were greatest in the morning. Osmotic values were increased by high light intensities, and by reductions in soil moisture. Comparisons of varietal osmotic values show that the greatest differences occur in late summer. *Vinifera* varieties tested (except Riesling 90) had a high average osmotic value, while *V. rupestris*, *V. monticola* and *V. armata* had very low average osmotic values. The interspecific hybrid MG 101-14 had the lowest value.—BundesforschAnst. Rebenzücht., Geilweilerhof.

3430. Filippenko, I. M.
Water uptake by roots during the movement of sap in the spring. [Russian.]
Fiziol. Rast., 1958, **5**: 175-7, bibl. 14, illus.

Root excavations and laboratory experiments on vines have shown that in early spring water is absorbed by non-suberized permeable cells of the rootlets formed in the previous season. In 1955, at Mičurinsk, the movement of sap in European × Amur vine hybrids started at a soil temperature of 4–4·5° C., in Vinifera × Labrusca hybrids at 5–5·5° C. and in Vinifera varieties at 6–6·5° C. Root regeneration started at higher temperatures, namely 8–10°, 10–12° and 12–14° C. respectively, and coincided with the beginning of bud burst.

3431. Kozma, P.
Caractérisation comparative chimique inorganique des différentes variétés sexuelles du cépage Kadarka. (**An inorganic chemical comparison of different sexual forms of the vine variety Kadarka.**) [English and Russian summaries ½ p. each.]
Acta agron. hung., 1958, 7: 365-78, bibl. 10.
A Kadarka szőlőfajta különböző ivari változatainak összehasonlító szervetlen kémiai elemzése. (**Comparative chemical analyses of different sexual forms of the Kadarka vine.**)
Szöl. Kut. Int. Évkönyve, 1958, **11** [no pagination], from abstr. in *Hung. agric. Rev.*, 1958, 7 (1), Abstr. 24.

A survey of the Kadarka vine growing area of Hungary showed a high proportion of female as against hermaphrodite types of plant on the dry, calcareous drift sands, and of the male type on the heavier, fertile soils. Analysis showed higher P and K and lower N figures for shoots of plants on drift-sands, while the male types were higher in N, the female in K and the hermaphrodites in P. The author suggests that the N: P or N+P: K ratio of the soil influences plant metabolism and hence sex expression. [For earlier work, see *H.A.*, 27: 205.]

3432. Alleweldt, G.
Eine Frühdiagnose zur Bestimmung der Fruchtbarkeit von Reben. (**An early estimate of vine fertility.**)
Vitis, 1958, **1**: 230-6, bibl. 4, illus.

The size and number of inflorescences within winter buds were taken as a measure of fertility. Fertility increased with plant age, and was also influenced by rootstock. The double "Bögrebe" method of pruning induced higher fertility than the cordon system.—BundesforschAnst. Rebenzücht., Geilweilerhof.

3433. Alley, C. J.
Machine to disbud rootstocks.
Calif. Agric., 1958, **12** (7): 8, 13, illus.

An electric bench grinder was adapted to form a saw or a wirewheel disbudding unit for use on vine rootstock cuttings. In tests with 2 rootstocks the saw was slightly quicker, but the wirewheel was more efficient in removing buds. Results of mechanical disbudding were more satisfactory with 1613 than with St. George stocks.—Univ. Calif., Davis.

3434. Lilov, D. C., and Mamarov, P. T.
Increasing the production of first-rate grafts of the [vine] variety Mavdur. [Russian.]
Vinodelie i Vinogradarstvo, 1958, **18** (3): 24-6, bibl. 3.

In Bulgaria the union of the important red wine variety Mavdur with Rupestris du Lot is unsatisfactory because the scion begins to form callus 6 days before the rootstock. To hasten callus formation on the rootstock cuttings were stratified or treated with 2,4-D or 2,4-DB before grafting, and to retard callus formation on the scion, graft wood was treated with hydroquinone. The best union resulting in the highest percentage of top quality grafts was obtained when the tips of the rootstocks were soaked in 2,4-DB at 1 mg./l. for 15 hrs and the scions in hydroquinone at 2 g./l. for 15 hrs.

3435. PENKOV, M. D.
The effect of rootstock length on root system development in vines after planting out. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1958, **23** (6): 19-26, bibl. 13, illus.

On calcareous and typical chernozems of poor water-retaining capacity in a low rainfall area of northern Bulgaria, increasing the length of rootstocks from the standard 32 cm. to 40 cm. was suggested as an anti-drought measure. Detailed soil analyses are given, and the root development is described of cuttings 24, 32, 40, 50 and 58 cm. long of Kober 5 BB, Chasselas × Berlandieri 41B and Rupestris du Lot, all worked with the variety Gimza. The long rootstocks did not have dispersed or weaker root systems, as suggested by other workers; 2-year-old vines on both long and short rootstocks developed vigorous root systems, although the main root mass was formed at a greater depth with the longer rootstocks.

3436. MANARESI, A., AND GHILLINI, C. A.
Ricerche sul trapiantamento di viti quasi adulte. **(Studies on transplanting adult vines.)**
Frutticoltura, 1958, **20**: 283-9, illus.

Seedling and grafted vines ranging in age from 4 to 9 years were successfully transplanted by reducing the crown to a few buds and allowing only 1–2 hours between lifting and replanting. Each plant was earthed up to a height of 10–20 cm. A wet spring favoured their establishment. A few perished after the dry spring of the following year. Other vines were transplanted from a 7-years established vineyard, pruning 1-year-old branches to 1·8 m. above ground, leaving a single shoot with 2 buds and pruning the roots to 40 cm. from the base of the plant. The soil was broken up to a depth of 1 m. and the roots were first immersed in a mixture of cow manure, liquid manure and soil. There were no failures among those vines which were liberally watered at and after transplanting and were protected from water loss by strips of paper bound round the stem, but 7 out of 20 without the paper died.

3437. ANON.
New fumigant kills unproductive vines.
West. Fruit Gr, 1958, **12** (7): 19, illus.

A simple and inexpensive method is described of removing from vineyards old, unproductive vines or rootstocks on which the scion has failed or been damaged. Vapam, at 150–300 c.c. (depending on size of the vine) in 3 gal. water, is applied in a shallow trench round the base of the vine. The chemical does not damage neighbouring vines and does not leave a lasting toxic residue in the soil.—Univ. Calif., and Stauffer Chemical Co., Calif.

3438. BAJESCU, N.
La fumure de la vigne. Roumanie. **(Manuring of vines in Roumania.)**
Bull. Off. int. Vin., 1958, **31** (328): 6-10.

Incorporation of farmyard manure at 40–60 tons per ha. to a depth of 35–45 cm. gave 20–25% increase in grape yields and the beneficial effects on yield and sugar production lasted at least 4 years. Fermented grape marc (distillation residue), applied at a rate of N and P equivalent to 40 tons of farmyard manure per ha., gave yields 5–8% lower than from the same rate of manure. Unfermented marc was not a satisfactory fertilizer. In one locality yields were increased 18–24% by green manuring, but in another with drier soil opening trenches for incorporating green manure reduced soil moisture and yield. The optimal application rates in kg. per ha. for major elements in mineral form were 100–150 of N, 150–225 of P_2O_5 and 100–150 of K_2O. These could be reduced by half when used in conjunction with 20–30 tons of farmyard manure per ha. Mineral fertilizers were more effective in granular than in powder form. In foliar nutrition experiments N+P gave a greater yield increase than N+P+K, the variety Chardonnay being more responsive than any of the others tested. Trace elements were applied as foliar sprays 10–15 days before flowering and yield increases were 18% with Mn, 8–10% with B and nil with Mo. All foliar nutrients were applied with bordeaux mixture.

3439. ANON.
La fumure de la vigne. Suisse. **(Manuring of vines in Switzerland.)**
Bull. Off. int. Vin, 1958, **31** (328): 11.

Fertilizer practices are briefly described for the French- and German-speaking sections. In the former a 4-year rotation has been evolved for farmyard manure, superphosphate, ammonium nitrate or sulphate and a potassium salt.

3440. PIMENTEL, S.
La fumure de la vigne. Portugal. **(Manuring of vines in Portugal.)**
Bull. Off. int. Vin, 1958, **31** (327): 26-37.

General practices involving farmyard manure, green manure, compost, guano, fish meal, oil cake, mineral fertilizers and lime are outlined. Experimental work in the Douro area on basic fertilizing, foliar nutrition and trace elements is described. The best basic treatment for high yield was a mixture containing N, P_2O_5 and K_2O in the ratio 1 : 1·25 : 1·5 with added B. Responses to P, K and various mineral sources of N are quoted. Excellent and economic results were obtained by spraying with N+P, P+K or N+P+K+B, simultaneously with bordeaux treatment. The beneficial effect of 6–8 g. of sodium borate per vine lasted at least 4 years. Foliar application of 0·5% borate was better than soil application where soil pH was 6–6·5. Reddening of leaves, a symptom of K deficiency, was prevented by foliar application of K.

3441. LOIZIDES, P. A.
Fertilizer experiments in Cyprus. III. Fruit trees and vines.
Emp. J. Exp. Agric., 1958, **26**: 229-39, bibl. 1.

In four experiments with vines marked responses to N and, to a lesser extent, to P fertilizer, have been obtained. The effect of K fertilizer was negligible. No effect of fertilizers on the density of the grape must was obtained except in one experiment in which N caused a decrease and K an increase. In two experiments, one with oval oranges and one with grapefruit, marked responses have been obtained to N and P when added together, but not separately. P also had a marked beneficial effect on fruit quality. K had no effect on either yield or quality. In one experiment the yield of olives was significantly increased by ammonium sulphate and to a much smaller extent by animal manure, but superphosphate had no effect. Figures are given for the N, P, and K contents of the leaves in all the experiments, and their significance is discussed. [Author's summary.] —Dep. Agric., Nicosia.

3442. DOBROLJUBSKIJ, O. K., AND SLAVVO, A. V.
The effect of the microelement cadmium on vines. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **118**: 1040-2, bibl. 11.

$CdSO_4$ at 5×10^{-3} and 5×10^{-5} was sprayed on vines at the beginning of full bloom (23,vi) and again when the berries were the size of small peas (10.vii). Both treatments improved yields, increased the sugar content, especially the fructose fraction, and reduced the acid content as compared with the controls. The treatments also reduced the oxidisability and iodine-reducing capacity of the leaf tissues and increased the ascorbic acid content of leaves and berries. The higher concentration had the greater effect on all variants.

3443. TILL, M. R.
What is the value of winter irrigation for Barossa Valley vineyards?
J. Dep. Agric. S. Aust., 1958, **61**: 489-92, bibl. 2.

Records from 1908 to 1957 indicated a close relationship between yield and rainfall of both the two previous winters. Winter rainfall, May to October, was also closely correlated with the May to June rainfall. It is therefore possible to calculate at the end of June the amount of irrigation water needed for the winter application. The use of saline water and the cost of equipment are discussed.

3444. KOVALEV, A. A.
Apparatus for the artificial pollination of vines. [Russian.]
Sad i Ogorod, 1958, No. 5, pp. 67-9, illus.

Dusting machines can be adapted to blow pollen from rows of vines with perfect flowers on to neighbouring interplanted rows of plants with functionally female flowers. Alternatively pollination can be assisted in a pure stand of perfect plants by blast in both directions across the rows.

3445. DOBROLJUBSKIJ, O. K., AND SLAVVO, A. V.
The use of potassium naphthoxyacetate and 2,4-dichlorophenoxybutyric acid in viticulture. [Russian.]
Fiziol. Rast., 1958, **5**: 190-3, bibl. 14.

Potassium naphthoxyacetate at 10^{-6} g. concentration and 2,4-DB at 10^{-7} g. sprayed on the vine variety Aligote 2–3 days before mass flowering (June 18) and again when the berries were the size of a small pea (July 12) advanced maturity and increased yield and quality. The time required for fermentation was prolonged by 2 days. The favourable effect of the treatments was evident, though on a reduced scale, the following season. When the growth substances were sprayed or applied to the soil at 100–1,000 times higher concentrations fruit set was improved but the size and sugar content of the grapes was reduced, probably owing to retarded maturation.

3446. ANTCLIFF, A. J., WEBSTER, W. J., AND MAY, P.
Studies on the sultana vine. VI. The morphology of the cane and its fruitfulness.
Aust. J. agric. Res., 1958, **9**: 328-38, bibl. 8.

The relationship between the morphology of sultana canes and their fruit production was studied to determine the value of external cane characters for the selection of pruning wood. Canes were rated on the following as desirable characters: well-ripened appearance, good diameter throughout, internodes not too long, and presence of persistent laterals. Canes tended to be more productive the higher their rating. Productivity was not directly affected by the age of the wood from which the canes arose nor by their having borne fruit; any differences found could be explained by differences in average rating. In each season nodes with persistent laterals were superior to nodes with deciduous laterals, and these in turn were superior to nodes without laterals, but there were no changes in the proportions of node types from season to season corresponding to changes in fruitfulness. It is concluded that the appearance of the cane is the only factor worth taking into account when pruning. No simple visual method was found which could replace microscopical examination in estimating fruitfulness to forecast potential crop. [Authors' summary. For Part V see *H.A.*, 27: 2221.]—Commonw. Res. Stat., Merbein, Vict.

3447. BELL, H. K., LARSEN, R. P., AND KENWORTHY, A. L.
Balanced pruning of the Concord grape—another look under present-day conditions.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 915-19, bibl. 1, illus.

The experiment reported confirmed that balanced pruning, in which the weight of 1-year-old wood pruned from each vine is used to determine the number of fruiting buds to be left, resulted in higher yields than (1) estimating the amount of 1-year-old wood by eye, or (2) pruning according to general vigour. Economically the time spent weighing the prunings was amply repaid.

3448. DARNAI, E.
A csemegeszőlő érésének és néhány fizikai sajátosságának vizsgálata. **(Studies on ripening and some physical characteristics of table grapes.)**
Szől. kut. Int. Évkönyve, 1958, **11** [no pagination], from abstr. in *Hung. agric. Rev.*, 1958, 7 (1), Abstr. 23.

Variations in sugar content of 6° to 14° were found within ripe bunches of grapes, and sampling from upper, middle and lower regions of the bunches is recommended. A new index for estimation of maturity is proposed, which is shown to be characteristic for each variety. Characteristics of berry firmness and elasticity and stalk adherence have been studied, and used in estimation of varietal behaviour during transport.

3449. Harth, S.
Raisin grader tested.
West. Fruit Gr, 1958, **12** (7): 15-16, illus.

The new Airstream Quality Grader for inspection of raisins is described. Weighed samples are slowly fed into an inverted-U-shaped grader. The sorting of good quality from light and malformed fruit is done by a vertical airstream in one arm at a controlled temperature. Results are corrected for moisture.

3450. Serini, G.
Contributi sperimentali alla conservazione dell'uva. **(Experiments on the storage of grapes.)** [English summary 6 lines.]
Ann. Sper. agrar., 1958, **12**: 779-84, bibl. 3.

The best conditions for storage of Regina dessert grapes were:—temperature 0·5° C., R.H. 90–95% and an atmosphere containing 10% of CO$_2$ and 18% of oxygen. Fumigation with 1% of sulphur dioxide for 25 min. resulted eventually in internal breakdown during cold storage in ordinary air. Further tests, combining the use of CO$_2$ and sulphur dioxide, are planned.

3451. Rakcsányi, L.
Szőlőmag-cserzőanyag kitermelése. **(Production of tannin from grape seeds.)**
Kisérletugyi Közl., 1957, No. 1, pp. 129-48, from abstr. in *Hung. agric. Rev.*, 1958, **7** (1), Abstr. 21.

A method of tannin extraction has been developed in which oil and tannin are extracted together, and then separated by means of a fat solvent. The amount of extractable tannin dropped after marc distillation.

Nuts.

(*See also* 3228, 3404, 3458m, 3459a, c.)

3452. Brossard, J.
Contribution à l'étude des réactions tannins-fer. **(Contribution to the study of tannin-iron reactions.)**
Summary in *C.R. Acad. Agric. Fr.*, 1958, **44**: 503-4.

The blackening of chestnuts processed as *marrons glacés* and *crème de marrons*, due to contact with iron, is preventible by tin in either the stannous or stannic condition, and by EDTA. Other less efficient inhibitors of the reaction are sodium hexametaphosphate and calcium phytate. In *Castanea sativa* the pericarp and testa both contain delphinidol, and the former also contains cyanidol, but in *C. crenata* the testa contains both substances and the pericarp lacks cyanidol.

3453. Bonifacio, G.
La coltura del pistacchio. **(Pistachio growing.)**
Riv. Ortoflorofruttic. ital., 1958, **42**: 149-54, bibl. 1, illus.

In areas with good soil seedling rootstocks are of cultivated pistachio varieties, but the wild type (*Pistacia terebinthus*) is used for poor or rocky soils. Seeds are sown in beds, or preferably in pots, in February. Seedlings are transplanted late in their second autumn, the roots being immersed in a slurry of cow dung and clay with added biammonium phosphate. The optimal spacing in good soil is 6–7 m. × 7–8 m. The vegetative phase lasts 12–15 years, or even longer if summer-harvested annuals are grown as cover crops, but green-manure legumes are very beneficial in arid areas. Injection of fertilizers, especially P and K, into the soil is more effective than superficial application. Grafting is carried out in summer, 2–3 years after transplanting, using active buds from the middle region of terminal shoots. Alternate placing of 2 rows of female plants and one row in which every third plant is a male has given very good pollination. Isolated trees can be budded on one branch with a male scion, which is kept well pruned. Brief notes are given on pruning, manuring, pests, harvesting and yields.

3454. Tuz, A. S.
Anomalous flowering and fruiting in walnut. [Russian.]
Priroda, 1958, **47** (5): 91-2, bibl. 3, illus.

On a walnut tree in Uzbekistan 8–25 female flowers developed in early May on the lower part of 26–42 cm. long racemes, and the male flowers towards the tip of the raceme opened throughout May–June. This late flowering is of practical interest for breeding to avoid spring frost.

3455. Maliga, P., and Tamási, J.
Diófagyökérzet alakulasa homoktalajban. **(The root formation of walnut trees in sandy soil.)** [English and Russian summaries ¾ p. each.]
Kert. szől. Főisk. Évk., 1957, **21** (5 part 4): 3-16, bibl. 22, illus.

An examination of a 24 year old seedling walnut tree in a vineyard showed no relationship between the branch and root systems. The diameter of the latter was 3½ times greater than that of the former. The root density beneath the crown was nearly three times that outside it. About 60% of the roots were found at a depth between 40 and 60 cm., and 88% between 40 and 220 cm. No antagonism was observed between the walnut and vine roots. The tap roots and some laterals developed broom-like branching above the light sand stratum, other laterals extended horizontally above this stratum, while some penetrated it vertically and then branched.

3456. Dahling, R.
Success with mechanization of walnut harvest.
West. Fruit Gr, 1958, **12** (6): 16-17, illus.

A system is described in which the orchard is levelled and rolled, and the nuts are shaken off the trees with a 25-ft boom shaker. The nuts are mechanically swept into windrows, collected by a pick-up machine and dumped into large trailer-mounted baskets. They are then dried in a prune dehydrator after clods and culls have been removed. High pruning has enabled mechanical equipment to operate freely. Harvesting costs were 2 cents per lb. compared with 5–6 cents for conventional systems.

3457. Rockland, L. B.
A new treatment of hygroscopic equilibria: application to walnuts (*Juglans regia*) and other foods.
Food Res., 1957, **22**: 604-28, bibl. 47, from abstr. in *J. Sci. Food Agric.*, 1958, **9**: i-277.

Hygroscopic equilibrium data for both in-shell and shelled walnuts were obtained and a mathematical expression for the representation of moisture sorption isotherms of walnuts and other products was obtained, a possible use of the isotherms being to estimate the relative stabilities of walnuts and other agricultural commodities during storage at various moisture levels. "Localized isotherm" constants are presented for 45 natural products including shelled and in-shell walnuts, beans, cabbage, spinach and carrots. The differential coefficient of moisture with respect to R.H. (dM/drh), which can be calculated from moisture sorption isotherms, may be related to stability characteristics of shelled walnuts and beans during storage.

Noted.

3458.

a Amerine, M. A., and Thoukis, G.
The glucose-fructose ratio of California grapes.
Vitis, 1958, **1**: 224-9, bibl. 16.
Ratios (determined by the Lothrop-Holmes method) varied from 0·80 to 1·12 in 8 table and 11 wine varieties.

b Andrási, E.
A szőlőfajták gyors elszaporítása zöld- és rügydugványzással. (**Rapid propagation of vines by layers and buds.**)
Szől. kut. Int. Évkönyve, 1958, **11**: [no pagination], from abstr. in *Hung. agric. Rev.*, 1958, **7** (1), Abstr. 22.
Layering of ripe and unripe shoots under glass and in the open, and propagation from buds under heat.

c Anon.
Bessen aan hagen. (**Growing [red] currants in hedges.**)
Fruitteelt, 1958, **48**: 738, illus.
A grower's experiment described.

d Avent, K. L.
Berry fruit growing in Victoria. 2. Raspberries.
J. Agric. Vict., 1958, **56**: 301-9, illus.

e Bell, T. A., and Etchells, J. L.
Pectinase inhibitor in grape leaves.
Bot. Gaz., 1958, **119**: 192-6, bibl. 16.

f Childs, W. H.
Currants. Another berry crop for the local market.
Science serves your Farm, being *Bull. W. Va agric. Exp. Stat.* **393** (3), 1957, p. 11.
In 10 years' trials vars. Wilder and Red Lake outyielded Perfection.

g Colquhoun, J. M.
The suitability of varieties of soft fruits for jam manufacture.
Idem. II. 1953-56, trials.
Res. Reps Brit. Food manuf. Ind. Res. Ass. **50,** 1953, pp. 22, illus., and **84,** 1957, pp. 20.
Raspberries and strawberries. Information confidential, for members only.

h Cosmo, I., Comuzzi, A., and Sardi, F.
Indagini sulla ricostituzione viticola nella pianura della provincia di Padova. Primo, secondo e terzo contributi. (**Studies on reconstitution of vineyards in the plain of the province of Padua. 1. Lowlying area, vine-growing sub-area of the Adige and Gorzon. 2. Cereal-growing sub-area of same. 3. Upper plain zone.** [English summaries.]
Ann. Sper. agrar., 1958, **12**: 585-619, bibl. 4, illus., 621-49, bibl. 3, illus., and 693-725, bibl. 1, illus.

i Cosmo, I., and Polsinelli, M.
Albana. (**The Albana grapevine.**) [English summary 3 lines.]
Ann. Sper. agrar., 1958, Vol. **12,** No. 2, Suppl. pp. CLXIII-CLXXII, bibl. 8, illus.
A white wine variety.

j Cosmo, I., and Polsinelli, M.
Ancellotta o Lancellotta. (**The grapevine variety Ancellotta or Lancellotta.**) [English summary 4 lines.]
Ann. Sper. agrar., 1958, Vol. **12,** No. 2, Suppl. pp. CLXXIII-CLXXXI, bibl. 8, illus.
A dark-fruited wine variety.

k Eaton, E. L.
The dimensions of plots for blueberry yield data.
From abstr. in *Agric. Inst. Rev.*, 1958, **13** (3): 38.

l Eisenhuth, F.
Qualitätsermittlungen an Erdbeersorten und ihre Ertragsleistung auf schwerem Boden am Rande des Harzer Regenschattengebietes. (**Quality evaluation of strawberry varieties and their production on heavy soils at the edge of the rain-shadow area in the Harz mountains.**) [Russian and English summaries 1 p. each.]
Arch. Gartenb., 1957, **5**: 467-503, bibl. 3, illus.
Including methods of determining quality and composition, and varietal trials.

m Evréinoff, V. A.
Contribution à l'étude des noisetiers. (**Contribution to the study of hazel nuts.**)
J. Agric. trop. Bot. appl., 1958, **5**: 274-96, bibl. 9.
The botany and distribution of *Corylus* species and cultivated varieties, with notes on pollination.

n Forshaw, J. E.
Cheddar strawberries.
Agriculture, Lond., 1958, **45**: 177-9.
The development of intensive cropping in an early area.

o del Gaudio, S., and Ciasca, L.
Somarello Rosso. (**The vine variety Somarello Rosso.**) [English summary 3 lines.]
Ann. Sper. agrar., 1958, **12** (3), pp. LXXI-LXXVI, bibl. 8, illus.
A reddish-violet dessert grape.

p DEL GAUDIO, S., AND NICO, G.
Bianco d'Alessano. **(The vine variety Bianco d'Alessano.)** [English summary 4 lines.]
Ann. Sper. agrar., 1958, **12** (3), Suppl. pp. LIX-LXIV, bibl. 5, illus.
Verdeca. **(The vine variety Verdeca.)** [English summary 3 lines.]
Ibid., pp. LXV-LXX, bibl. 7, illus.
Both are white wine varieties.

q GROLLEAU, J., AND PREVOST, H.
Observations sur le comportement de differentes varietes de fraisiers. **(Observations on the behaviour of several varieties of strawberry.)**
Terre maroc., 1958, **32**: 263-8, bibl. 1.
Satisfactory yields over a 3-year period from 7 varieties.

r KRONENBERG, H. G., AND WASSENAAR, L. M.
Juspa, een nieuw middentijds aardbeiras. **(Juspa, a new mid-season strawberry variety.)**
Fruitteelt, 1958, **48**: 756-7, illus.
Juspa (I.V.T.667) is a hybrid of Jucunda and Sparkle.

s LOOMIS, N. H.
Performance of *Vitis* species in the south as an indication of their relative resistance to Pierce's disease.
Plant Dis. Reptr, 1958, **42**: 833-6, bibl. 4.
Notes on longevity and other characters of 31 *Vitis* species and some varieties in Mississippi, for breeding purposes.

t LOVATT, B. A.
Lanarkshire fruitgrowing.
Scot. Agric., 1958, **38**: 32-5, bibl. 1, illus.
Strawberries, raspberries, tomatoes, plums and gooseberries.

u MCCULLOCH, R. N. (MATTHEWS, C. D.).
Progress of viticultural investigations at Roseworthy Agricultural College, 1956-57.
J. Dep. Agric. S. Aust., 1958, **61**: 443-5.
Breeding and selection, soil management and pruning trials.

v MAZZEI, A., AND ZAPPALÀ, A.
Nerello Mascalese. **(The vine variety Nerello Mascalese.)** [English summary 3 lines.]
Ann. Sper. agrar., 1958, Vol. **12**, No. 2, Suppl. pp. CXCV-CCII, bibl. 3, illus.
A dark-fruited wine variety.

w MOUAT, H. M.
N.Z. varieties of yang-tao or chinese gooseberry (*Actinidia chinensis*).
Orchard. N.Z., 1958, **31**: 135, 137.
Notes on desirable types.

x NEGRUL', A. M., AND LJU-JUJ-JAN'.
Viticulture in China. [Russian.]
Vinodelie i Vinogradarstvo, 1958, **18** (3): 32-6, illus.
Wild species, cultivated varieties, cultural practices and pests and diseases.

y (OLMO, H. P.)
New table grape faces test.
West. Fruit Gr, 1958, **12** (7): 25, illus.
Variety Gold, an improved and mild flavoured muscat type, bred at Univ. Calif., Davis.

z PEYER, E.
Reduzierte Laubarbeiten beim Stickelbau. **(Reduced summer pruning for staked vines.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 434-7.
Some further figures in support of the labour saving recommendations on summer pruning noted in *H.A.*, 24: 3566.

3459.

a STEFANI, A.
Mandorlo, nocciuolo, noce e pistacchio. **(Almonds, hazel nuts, walnuts and pistachio nuts.)**
Ital. agric., 1958, **95**: 151-60, illus.
Requirements, uses, products and by-products, production and export.

b SUMMERHAYES, G. S.
The Australian berry fruit industry.
Quart. Rev. agric. Econ., Canberra, 1958, **11**: 44-8, bibl. 4.
Acreages and production of small fruits.

c VASIL'ČENKO, I. I.
Leaf polymorphism in walnut. [Russian.]
Bot. Žurnal, 1958, **43**: 287-90, bibl. 19, illus.
Leaf forms in *Juglans regia* and some other species of *Juglans*.

d VIOLANTE, C., AND BORDIGNON, S.
Coda di Volpe Bianca. **(The grapevine variety White Coda di Volpe.)** [English summary 3 lines.]
Ann. Sper. agrar., 1958, Vol. **12**, No. 2, Suppl. pp. CLXXXIII-CXCIII, bibl. 13, illus.
For wine making.

e WÄCKERLIN, O.
Jahresbericht 1957 über die Rebversuchsanlagen im Kanton Schaffhausen. **(Annual Report on the Experimental Vineyards in the Canton of Schaffhausen for 1957.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 409-13.
With tables on labour requirements.

f WASSENAAR, L. M.
Determinatietabel en beschrijving van een aantal aardbeirassen. **(Identification key and descriptions of several strawberry varieties.)**
[*Publ.*] *Inst. Vered. Tuinbouwgewass., Wageningen*, 2nd edition, 1958, pp. 52, illus.

g WATSON, W. W.
Delta strawberry studies show best adapted varieties.
Miss. Fm Res., 1958, **21** (3): 5, illus.
Dixieland, Albritton and Pocahontas had highest yields.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

See 3565, 3571, 3581-3588, 3796m, 4162, 4200c.

Disturbances of nutrition or of unknown origin.

(*See also* 3256, 3337, 3347, 3393, 3394.)

3460. SCHANDER, H.
Über die Bodenmüdigkeit beim Apfel und über Versuche, Marschböden auf Bodenmüdigkeit zu testen. **(On soil sickness in apples and on experiments to test marshy soils for soil sickness.)**
Mitt. ObstVersuchsringes Jork, 1958, **13**: 188-95, bibl. 20.

The article is largely a discussion on the problem of genuine soil sickness in deciduous fruits and on the possibility of diagnosing the malady by analysing the soil for the presence of certain glycosides. [For an earlier discussion see *H.A.*, 27: 253.] Small-scale experiments by the author, in which apple seedlings followed apple seedlings, show that the danger of soil sickness is not urgent in the Alte Land, although precautions ought to be taken.

3461. BÖRNER, H.
Untersuchungen über den Abbau von Phlorizin im Boden. Ein Beitrag zim Problem der Bodenmüdigkeit bei Obstgehölzen. **(Studies on the decomposition of phlorizin in the soil. A contribution to the problem of soil sickness in fruit trees.)**
Naturwissenschaften, 1958, **45**: 138-9, bibl. 2.

The author suggests that phlorizin is one of the toxins in the soil causing soil sickness which were postulated by Schander [*H.A.*, 26: 2561 and 27: 253]. The substance is present in fairly large amounts in the bark of apple roots from which they diffuse into the soil. There phlorizin is decomposed by micro-organisms, but fresh amounts of the compound are released by living or residual apple roots. The decomposition of phlorizin has been investigated and a study of the effect of phlorizin and its decomposition products on the growth of apple seedlings is in progress.—Boyce Thompson Inst. Plant Res., N.Y.

3462. HAVIS, L., AND OTHERS.
Responses of replanted peach trees to soil treatments in field tests in Texas.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 67-76, bibl. 6.

Young peach trees were planted on old peach sites at 3 locations. Where the replant problem was the most serious, soil fumigation with methyl bromide gave striking benefits in new tree growth. Neither the reasons for the difficulty in replanting nor the effect of fumigation are understood. At 2 locations where trees had grown well previously replanting caused no problem. In no case did liming or various fertilizers show any significant benefit.—U.S.D.A., Beltsville, Md, and Tex. agric. Exp. Stat.

3463. BEYERS, E.
Control of iron deficiency in fruit trees.
Fmg S. Afr., 1958, **34** (4): 9, illus.

In a lime-rich soil (pH 7·5 to 8·5), chelate applications to the soil and foliage did not correct iron deficiency in peach and apricot trees. Promising results were obtained with applications of compost plus iron sulphate in holes round the trees or S plus iron sulphate in a small strip round the trees.

3464. RECKENDORFER, P.
Die Kalkchlorose in ihren Beziehungen zum Eisen. Das physiologische Eisenvakuum. I. Teil: Modellversuch im Obstbau. Vorläufige Mitteilung. **(Lime-induced chlorosis in relation to iron. The physiological iron vacuum. I. Pilot trial in the orchard. Preliminary report.)** [English summary 5 lines.]
PflSch. Ber. Wien, 1958, **21**: 33-43, bibl. 9.

The assimilation of an Fe-chelate was studied in chlorotic pear leaves. The chelate was able to correct chlorosis only when its structure allowed assimilation into an enzyme or enzyme system.—Lab. Bundesanst. PflSch., Wien.

3465. BUTIJN, J., AND OTHERS.
Het gebruik van ijzerchelaten in de fruitteelt. **(The use of iron chelates in fruitgrowing.)** [English summary 7 lines.]
Meded. Dir. Tuinb., 1958, **21**: 277-82, bibl. 4.

Soil applications of Fe-EDTA, Fe-DTPA and Fe-EDDHA were given to apple and pear orchards at several places in Zeeland. In some cases Fe deficiency was corrected, and levels of 5–250 g. were effective. Results were affected by soil type, dosage level, variety, rootstock and tree age, but further studies on these aspects are required.—Proefst. Fruit. volle Grond, Wilhelminadorp, and Rijkstuinbouwconsulentschap, Geldermalsen.

3466. ŠPOTA, L. A.
The water regime of apple trees and other woody species in relation to chlorosis. [Russian.]
Uč. zap. biol.-počv. Fak. Kirg. Un-ta, 1955, No. 5, pp. 120-42, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 77,797.

In theČu Valley (Kirgiz S.S.R.) transpiration, distribution of water and chlorophyll content were studied in the leaves of apple and other trees. Chlorotic leaves were found to transpire less than green leaves. Reduced transpiration and increased water content in the leaves of chlorotic shoots were the result of low chlorophyll content. When a chlorotic leaf contained a considerable amount of chlorophyll, as in the case of white acacia, it did not differ from a green leaf with regard to transpiration and water content. In chlorotic leaves of apple, elm and apricot the stomata opened or closed only on areas containing a relatively large amount of chlorophyll.

3467. OGANESJAN, A. P.
The effect of ground water on the development of fruit crops. [Russian.]
Sad i Ogorod, 1958, No. 5, pp. 44-7, illus.

Faulty orchard irrigation in Armenia raised the water table and caused soil salinity. Studies on this problem showed that ground water containing 3 g./l. salt is harmless to fruit trees, provided the water table is not higher than 3 m. A salt content of 5–6 g./l. retards growth, and 10 g./l. causes rapid death of apricot, peach, apple and plum. Particularly susceptible to saline ground water are walnuts and hazel nuts. Fluctuations in the water table and salinity during the growing period, especially during flowering, are more harmful than a slow build-up.

3468. FISHER, E. G., AND OTHERS.
Studies on the control of magnesium deficiency and its effect on apple trees.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 1-10, bibl. 5.

In a trial in 2 apple orchards, started in 1954, a comparison was made between limestone containing 3 levels of Mg, mulching and disking. The results indicated that 20% MgO limestone was more effective in increasing leaf Mg than 12% limestone. Disking the lime in gave significant increases in leaf Mg by the third year on the heavier soil but not on the sandier soil. Mulching had little effect on leaf Mg but increased leaf N. The 12% MgO limestone was more effective than the 20% MgO limestone in increasing soil pH, but was less effective in increasing available soil Mg. Disking increased both the rate of pH increase and the supply of available Mg. Leaf samples collected in June showed slight differences in Mg content, but September samples showed a drop in Mg content in the leaves from the orchard which responded to Mg application in fruit size and yield. The data suggest that leaf samples collected at harvest time may be the more reliable guide to Mg deficiency.—Cornell Univ., N.Y.

3469. JOHANSSON, E.
Magnesiumbrist vid fruktodling. (**Magnesium deficiency in fruit growing.**)
Fruktodlaren, 1958, **29**: 80-1, bibl. 6.

During September young apple trees on M.I, IV and VIII showed distinct symptoms of Mg deficiency, while those on A2, M.XII and M.XIII were a normal green colour. Deficiency of Mg was probably induced by high K manuring.

3470. DELAP, A. V., AND FORD, E. M.
Studies in the nutrition of apple rootstocks. 1. Effects of deficiencies of iron and magnesium on growth.
Ann. Bot. Lond., 1958, **22**: 137-58, bibl. 36, illus.

Plants of the apple rootstock M.VII were grown for a single season by spraying their roots continuously with nutrient solutions: (*a*) complete, (*b*) low Fe, (*c*) low Mg, and (*d*) low Fe and low Mg. Detailed records were taken throughout the season of fresh weight, shoot length, [stem] diameter and leaf area, while the fresh and dry weights of component parts were determined on harvested samples. The leaves of the Fe-deficient plants were chlorotic and had a lower dry weight and higher water content per unit area than those of the control plants. Growth and net assimilation rate were both reduced but the distribution of assimilates was similar to that in the controls. Total growth was also markedly reduced by the low-Mg treatment, but the leaf symptoms were different and the plants were morphologically distinct from the control plants. Very little chlorosis occurred, but necrosis and severe defoliation, progressing up the shoot, reduced the leaf area ratio and probably largely accounted for the low net assimilation rate and relative growth rate. The diameter of the shoot was affected much more than its length and the shoot/root ratio was greatly increased. Plants deficient in both Fe and Mg showed less defoliation than when Mg alone was low. More dry matter accumulated in the old stem and less in the new shoot than would have occurred with a simple combination of the single deficiencies. [Authors' abstract.]—East Malling Research Station, Kent.

Climatic factors.

(*See also* 3230, 3235, 3291, 3292, 3298-3300, 3302, 3303, 3311, 3332, 3552, 3561d, 3562g, o, p, t.)

3471. BISHOP, C. J.
The influence of climate on the colour and size of Nova Scotia apples.
From abstr. in *Agric. Inst. Rev.*, 1958, **13** (3): 30.

Climatic factors have been shown to have an important influence on the development of apples in Nova Scotia and to a large extent determine the suitability of specific varieties for growing in this area. In general rainfall and sunshine are not limiting factors in apple development, but low temperature in some years may retard fruit sizing and maturity. While hail is relatively unimportant, wind is a serious hazard some years.—Canada Dep. Agric., Kentville.

3472. PISEK, A.
Versuche zur Frostresistenzprüfung von Rinde, Winterknospen und Blüten einiger Arten von Obsthölzern. (**Studies on testing bark, winter buds and flowers of some species of fruit trees for frost resistance.**)
Gartenbauwiss., 1958, **23**: 54-74, bibl. 29, illus.

Bark of Ontario apple, cherry and apricot, which withstood temperatures of −25° C. to −30° C. during the winter, became much less resistant in the spring (−4° C. to −7° C.). Similar effects are shown with winter buds of the 3 species. Comparisons between 3 apple varieties showed that resistance of Boskoop and Bohnapfel increased during the winter, and that Baumanns Renette was the most susceptible to frost; in spring Boskoop lost its resistance more quickly than the other varieties. Resistance was also reduced after short periods of higher temperatures. Flower initials within the buds were less frost-resistant than the bark; the pistil was the most susceptible of the floral parts.—Bot. Inst., Univ. Innsbruck.

3473. RJADNOVA, I. M.
The relationship between the date of formation of fruit buds and their frost resistance. [Russian.]
Fiziol. Rast., 1958, **5**: 288-90, bibl. 7.

The date of the formation of fruit buds depends on conditions during the growing period, and their hardiness on the stage of development reached. On weaker branches and less vigorous trees or under unfavourable conditions buds are formed and mature earlier and, being in an advanced stage of development, are more readily injured by late winter frost. On vigorous trees under favourable conditions of growth the period of bud formation is prolonged, and a sequence of buds reaching maximum hardiness during different periods of the winter occurs. In the southern regions, on stone fruits, buds on vigorous shoots are generally uninjured by late winter frost and those on weak shoots by early frost.

3474. GENÈVE, R.
Le controle de la lutte contre la grêle. **(Checking the effectiveness of hail control.)** [English summary 5 lines.]
Bull. Obs. du Puy de Dome, 1958, No. 2, pp. 57-62, bibl. 2.

In comparing statistics for 8 years prior to 1951 and 7 years from 1951 onwards, during which large-scale seeding of clouds took place, no significant effects due to seeding were observed on the probability of hail occurring during a storm, on the diameter of the hailstones or on the duration of the fall.

3475. BRANAS, J.
Le folletage en mai 1958. **(Shoot desiccation in May 1958.)**
Progr. agric. vitic., 1958, **149**: 241-7, illus.

Observations on damage done to vines by drying spring winds have shown that the most sensitive shoots are on young vines, on sandy, shallow and badly-drained soils or on stocks of *Vitis riparia* varieties or *Riparia-Berlandieri* hybrids.

Viruses.

(*See also* 3561j, u, x, 3562a.)

3476. BARRAT, J. G., SMITH, W. W., AND RICH, A. E.
Transmission of the dapple apple virus.
From abstr. in *Phytopathology*, 1958, **48**: 260.

Symptomless 15-year-old apple trees of Cortland, McIntosh, Golden Delicious, Starking Delicious, Baldwin, and Macoun were inoculated by budding in the spring of 1955. The source of inoculum was a tree topworked to Cortland with an interstock of Virginia Crab, both showing symptoms of dapple apple. Three or 4 buds from either the Cortland variety or the Virginia Crab interstock were placed in each of 2 branches on opposite sides of each tree. Symptoms first appeared in 1957 on Cortland, McIntosh, Golden Delicious and Starking Delicious. Apples in the vicinity of the inoculating buds in either direction along the limb remained symptomless; however, those growing on the first or second side branches centripetally to the buds developed symptoms, indicating an unusual pattern of virus movement through the tree. A Starking Delicious tree with 10 buds placed at random had a greater number of dappled fruits than did McIntosh or Cortland budded on opposite sides. An incubation period of more than 1 growing season appears to be necessary for expression of symptoms.

3477. ANON.
Virus in wild blueberries.
Agric. Res. Wash., 1958, **7** (1): 16.

Wild plants have been found to act as a reservoir for stunt virus, thought previously to be introduced only in cultivated varieties. Growers are therefore recommended to control leafhopper vectors and to destroy wild blueberries near commercial plantations.

3478. KRIMBAS, B.
La dégénérescence infectieuse de la vigne. **(Infectious degeneration of vines.)**
Bull. Off. int. Vin, 1958, **31** (327): 7-24, illus.

Symptoms described for vines in Greece include peculiar stem fissures. The disease in that country does not materially affect production. There is considerable difference in varietal susceptibility.—Sch. agron. Studies, Athens.

3479. VUITTENEZ, A.
Transmission par greffage d'une virose du type "enroulement foliaire" commune dans les vignobles de l'est et du centre est de la France. **(Transmission by grafting of a virus of the leaf-roll type common in the vineyards of east and east-central France.)**
C.R. Acad. Agric. Fr., 1958, **44**: 313-16, bibl. 11.

A leaf-roll, thought to be the same as white emperor disease, was successfully transmitted by double grafting into the Vinifera variety Pinot noir but not into the American hybrid stock Kober 5BB.

Bacteria.

(*See also* 3561b, q, 3637.)

3480. RIDÉ, M., AND ŠUTIĆ, D.
Un dessèchement des pousses de poirier d'origine bactérienne. **(A die-back of pears of bacterial origin.)**
C.R. Acad. Agric. Fr., 1958, **44**: 384-7.

Symptoms including the drying and blackening of flowers and young vegetative growth are described. The causal organism was shown to be *Pseudomonas syringae*, not previously observed on pears in France. Preliminary experiments have pointed to the efficacy of streptomycin sulphate at 50 p.p.m., aureomycin chlorohydrate at 10 p.p.m., tetracyclin chlorohydrate at 1 p.p.m. and certain organomercurials such as mercury methoxyethyl chloride as bactericides.

3481. VERNEAU, R., AND ROSA, M.
Prime prove di lotta in pieno campo contro la vaiolatura batterica dell'albicocco, con un preparato a base di streptomicina e terramicina. **(Preliminary field tests on control of bacterial black spot of apricots by means of a preparation containing streptomycin and terramycin.)** [English summary ½ p.]
Boll. Staz. Pat. veg. Roma, 1957 (issued 1958), **15**: 171-86, bibl. 33, illus.

Agrimycin at 100 p.p.m. active substance, sprayed 5 times at 8-day intervals from fruit set onwards gave satisfactory control of *Xanthomonas pruni* on apricots, but failed to prevent secondary infection after the final treatment. Its action on diseased tissue was curative, but the leaves became temporarily chlorotic. Zinc sulphate sprayed 3 times at 15-day intervals as 1·5% solution gave slightly, but not significantly, better control of the disease, but caused slight leaf scorch and considerable russeting of the fruit.

3482. (ENGLISH, H., AND DEVAY, J. E.)
Expanded bacterial canker research brings new facts.
West. Fruit Gr, 1958, **12** (7): 32.

The value of 2 autumn bordeaux sprays for control of peach canker is confirmed. Magnesium oxide as a soil treatment was equally effective. Maintaining vigour by the use of fertilizers also gave some control. In one orchard the best control was obtained by application of the soil fumigants DD and chloropicrin prior to planting.—Univ. Calif., Davis.

Fungi.

(*See also* 3397, 3398, 3561a, e, n, t, v, z, 3562b, d, q, 3637.)

3483. Hutton, K. E.
Black spot eradicated from New South Wales orchard.
Agric. Gaz. N.S.W., 1958, **69**: 155.

Successful treatments for scab given to an isolated orchard were as follows: 0·1% phenyl mercuric acetate sprayed in autumn 1955; lime-sulphur sprayed in December as a trace of infection was seen in one corner; 0·1% phenyl mercuric chloride sprayed in autumn 1956. No fungicide has been applied since and 4 infected leaves only have been observed to date.

3484. Plant Pathology Division, Tasmanian Department of Agriculture.
Winter sprays for control of black spot of apples.
Tasm. J. Agric., 1958, **29**: 149-50, bibl. 2.

Two scab control methods are recommended for Tasmania: either DNOC at 400 gal./acre of ½% solution plus 4 oz. of emulsit applied after ploughing in August, or 0·1% phenyl mercury chloride applied before leaf-fall and after harvest. If DNOC is used the land should be left undisturbed for as long as possible, at least until the end of November.

3485. Hirst, J. M., and Stedman, O. J.
Apple scab.
A.R. Rothamsted exp. Stat. 1957, 1958, p. 117.

Accurately timed spraying of Bramley's Seedling trees with phenyl mercury compounds reduced the average number of *Venturia* ascospores caught in 2 years of treatment to 4% of that for the 3 years preceding treatment, and greatly decreased the ascospore population on dead leaves. A prototype of the simplified surface-wetness recorder, used to indicate likely conditions for infection, has now gone into production. [See also *H.A.*, 28: 3337n.]

3486. Miotto, G.
Prove sperimentali sulla ticchiolatura del melo nel 1957 con lo zineb. **(Experimental tests on apple scab in 1957 with zineb.)**
Not. Mal. Piante, 1958, Nos 43/44, pp. 225-30.

Zineb at 0·15% was equal or slightly superior to 0·4% copper-calcium oxychloride in controlling apple scab. An aluminium compound at 2–3% caused marked fruit drop and retarded early fruit growth, but significantly increased the average weight per fruit. The fruit of the variety Rome Beauty was highly sensitive to copper and heavily russeted by it.

3487. Powell, D.
An evaluation of some of the common fungicides for control of apple scab.
Trans. Ill. St. hort. Soc., 1957, 1958, **91**: 28-9.

Data for 9 preparations are given on the longest period after infection in which the fungicide may be used effectively, and on the period after application for which it remains effective.

3488. Hamilton, J. M., and Szkolnik, M.
Movement of dodecyl guanidine derivatives through the leaf in the control of apple scab and cedar-apple rust fungi.
Abstr. in *Phytopathology*, 1958, **48**: 262.

Foliage of greenhouse-grown Rome Beauty apple trees was protected against the apple scab fungus (*Venturia inaequalis*) and the cedar-apple rust fungus (*Gymnosporangium juniperi-virginianae*) by spraying the underside of the leaf with the acid phthalate and with the acetate salts of dodecyl guanidine (American Cyanamid experimental fungicides 23441 and 5223, respectively) prior to inoculating the top side of the leaf with the respective fungi. The fungicides were evaluated on the basis of ⅓ and 1 lb. active chemical per 100 gal. with the addition of a surface-active material (Tween 20). These materials were ineffective when applied in this manner in post-infection tests. Local systemic protective inhibition or suppression of scab was also obtained with captan, dichlone, glyodin and ferbam, although such activity was not so effective or consistent as that of the dodecyl guanidines. This activity with the standard fungicides was observed, for the most part, on terminals that were growing slowly, and the leaves were not very susceptible to scab.

3489. Simard, J., Pelletier, R. L., and Coulson, J. G.
Screening of microorganisms inhabiting apple leaf for their antibiotic properties against *Venturia inaequalis* (Cke.) Wint.
Rep. Que. Soc. Prot. Plants, 1957, 1958, **39**: 59-67, bibl. 10, illus.

Agar plates containing colonies of micro-organisms isolated from dead apple leaves were sprayed with spore suspensions of *V. inaequalis*. After a period of incubation, colonies that prevented the germination of conidia were isolated and maintained in pure cultures. These isolates were assayed in agar-streaking tests against *V. inaequalis* and *Phytophthora infestans*. In these tests out of 34 colonies isolated in the dilution plates, 12 isolates, most of them belonging to the genus *Penicillium*, gave large inhibition zones, and so were kept for further study. Three of these isolates were found to produce diffusible materials antibiotic to *V. inaequalis* when grown in different liquid media. [From authors' summary.]

3490. Doepel, R. F.
Pear scab. Results of recent spray trials.
J. Agric. W. Aust., 1958, **7**: 329-34, bibl. 2, illus.

The results of spray trials are discussed and the following control measures recommended. Spring and early summer: at spur-burst and white-bud—captan, 1½–2 lb. per 100 gal., or captan, 1¼ lb. per 100 gal., plus phenyl mercury compound at ¾ normal strength; at bloom—

captan; at petal fall—as for spur-burst; after petal fall at 12–14 day intervals—captan. PMC should not be used on var. Josephine or later than petal fall on any variety for risk of spray injury. For autumn spraying after harvest but before leaf fall PMC, 0·1% a.i., should be used on leaves on the tree and the ground.

3491. Aerts, R., and Soenen, A.
Apple powdery mildew, *Podosphaera leucotricha* (Ell. and Ev.) Salm.
Höfchen Briefe, 1957, **10**: 109-72, bibl. 57, illus.

Studies on the biology of apple powdery mildew show that the most serious infections generally occur in May, but infection may continue until August. Curative control measures were not successful, but excellent results were obtained with prophylactic sprays of micro wettable sulphur. Sprays should be applied during critical periods of infection, so that the number of applications may be reduced. Mechanical removal of infected shoots during winter and spring is recommended as a supplementary control measure. It is suggested that a warning service for growers should be established.—Centre Rech., Gorsem.

3492. Schander, H.
Untersuchungen zur Entwicklung von Frühselektionsmethoden für die Apfelzüchtung. II. Über Frühselektion auf Resistenz gegen Apfelmehltau (*Podosphaera leucotricha* Salm.), über die Anfälligkeit von Apfelsorten und über die Vererbung der Anfälligkeit. (**Studies on the development of early selection methods in apple breeding. II. Early selection for resistance to apple mildew, the susceptibility of apple varieties and the genetical basis of susceptibility.**)
Züchter, 1958, **28**: 105-32, bibl. 151.

The degree of mildew infection on 3-year-old seedlings of 22 hybrid progeny, and on bearing trees of 156 varieties has been evaluated. The amount of infection was primarily related to variety, but there was a certain effect of rootstock, and some modifying effect of environment. Amongst hybrid seedlings the percentage of infection became higher, in general, as the susceptibility of the parents increased, but the influence of the maternal parent was stronger than that of the pollen parent. Results indicate that early selection for mildew resistance is possible in seedlings. Mildew resistance did not appear to be either a dominant or a recessive character. In general resistance was not affected by mutation, and there was no difference between diploid and triploid varieties. The literature on apple mildew is reviewed, and the possibilities of selection at an early stage are discussed. [For part I see *H.A.*, 28: 1091.]—Obstbauversuchsanstalt, Jork.

3493. Groves, A. B.
The influence of timing and rates of usage of Karathane on the control of apple powdery mildew.
From abstr. in *Phytopathology*, 1958, **48**: 262.

Karathane was applied to the susceptible Rome variety at rates of 4, 8, 12 and 16 oz. per 100 gal. of spray at 7-, 14- and 21-day intervals throughout the period of infection by *Podosphaera leucotricha*. Treatments were applied separately from a standard spray programme. Applications of Karathane began in the late bloom period and continued at the noted time intervals until terminal growth ceased. Foliar infection counts were made following the completion of 9 weekly applications. Percentage control of infection by the application of 16, 12, 8, and 4 oz. at weekly intervals was 99·7, 99·0, 98·4, and 94·5, respectively; at 2-week intervals it was 95·9, 93·5, 87·0, and 86·5, respectively; and at 3-week intervals it was 85·4, 86·7, 75·0, and 58·4, respectively. The break in dosage response came between 8 and 12 oz.; the break in influence of timing interval came between 7 and 14 days. [See also *H.A.* 28: 2361.]

3494. Hutton, K. E., and Leigh, D. S.
Dothiorella canker and dieback of apple trees.
Agric. Gaz. N.S.W., 1958, **69**: 192-5, bibl. 1, illus.

Botryosphaeria ribis invades the bark of apple trees producing a range of symptoms, namely *Dothiorella* limb canker, shoot blight, spur blight and, in association the pinhole borer (*Xyleborus pseudoangustatus*), trunk canker. This last is now not very serious, as DDT sprays for codling moth control the beetle. The other phases of the disease can be controlled by using bordeaux at green cluster stage and thiram at petal-fall with 2 subsequent sprays at 3-week intervals. J.R.L.

3495. Corke, A. T. K.
Leave a snag when summer pruning.
Grower, 1958, **50**: 281.

Infection of cut apple shoots by *Gloeosporium perennans* occurred in July, but cankers produced were smaller than those from November infections. There are indications that the extent of cankering is related to cell water contents. In uninfected shoots callus usually formed about 0·15 in. above the first bud, and, to reduce the liability of shoots to infection, it is recommended that a snag at least ¼ in. above the first bud should be left at summer pruning.—Long Ashton Res. Stat.

3496. Rasmussen, P. M., and Jepsen, H. M.
Forsøg med bekaempelse af *Gloeosporium* på aebler. (**Studies on the control of gloeosporium** on apple.) [English summary ¾ p.]
Tidsskr. Planteavl., 1958, **62**: 280-91.

Fungicides applied before flowering gave little control of gloeosporium; with the addition of post-blossom sprays control was improved until with 7 sprays during the season only 5% of the fruit was affected. The level of fruit infection increased when 1 spray was omitted, irrespective of timing. Thiuram and captan were the most successful of the fungicides used.

3497. Spencer, D. M., and Wilkinson, E. H.
A method of reducing the losses caused by *Gloeosporium* spp. in stored apples.
Nature, 1958, **181**: 1603-4, bibl. 4.
Chemical on tray liners cuts gloeosporium.
Grower, 1958, **49**: 1589-91, illus.

The 3 middle apple storage trays of a stack of 9 were each covered underneath by a box liner impregnated with a solution of (2: 4: 5-trichlorophenoxythio)trichloromethane in acetone, and all 9 trays were filled with Cox's Orange Pippin apples heavily inoculated with spores of *G. perennans*. The stack was covered by a polythene tent 5 ft × 2 ft × 2 ft, allowing 1 g. of the chemical per 10 cu. ft of air space. In the control tent all 9 trays of infected apples were without treated liners. After 4 months only 25% of the control apples were completely sound, compared with 42·3% in the treatment tent and 60·2% in the 3 trays immediately below the treated liners. The average number of lesions per fruit was correspondingly reduced from 3·4 to 1·5 and 0·63 respectively.—Wye Coll., Kent.

3498. COLE, M.
Oxidation products of leuco-anthocyanins as inhibitors of fungal polygalacturonase in rotting apple fruit.
Nature, 1958, **181**: 1596-7, bibl. 18.

Data on the loss of phenolic compounds during rotting of apples are quoted and discussed. Experiments with polyphenolic compounds extracted from Bramley's Seedlings showed that probably only the leucoanthocyanins could act as precursors of the inhibitors of polygalacturonase in *Sclerotinia fructigena*.—Imp. Coll. Sci. Technol., London.

3499. JEROME, S. M. R.
Brown rot of stone fruits. Latent contamination in relation to spread of the disease.
J. Aust. Inst. agric. Sci., 1958, **24**: 132-40, bibl. 7.

Evidence is given that infection by brown rot (*Sclerotinia fructicola*) and establishment of the fungus on peaches can occur quickly and disastrously under natural conditions as a result of conidia on the surface of the fruit arising from a few early foci of infection. Bruising and splitting of the fruit allow the pathogen to invade rapidly, irrespective of the state of maturity of the fruit. It is suggested that a spraying programme for the control of the disease would be most effectively regulated if guided by a forecasting system based on the conidial population on the fruit.—C.S.I.R.O., Canberra. J.R.L.

3500. RUI, D., AND COSOLO-GIUSSANI, A.
Prove biennali con ziram nella lotta contro le malattie crittogamiche del pesco. (**Two-year tests with ziram for control of fungus diseases of peach.**)
Not. Mal. Piante, 1958, Nos 43/44, pp. 231-2, bibl. 1.

Winter and early spring treatments were carried out with ziram at 0·2–0·9%, bordeaux mixture at 3% or copper oxychloride at 0·8%. All the treatments gave practically complete control of peach leaf curl (*Taphrina deformans*). Ziram at 0·6% and 0·9% and the copper treatments gave very good control of shot hole (*Clasterosporium carpophilum*), preventing attacks on the fruit, but the lower ziram concentrations were ineffective. Curative treatment with 0·25% ziram for leaf curl and gummosis in spring was very successful. [See also *H.A.*, 26: 2605.]

3501. (DAINES, R. H., BRENNAN, E. G., AND LEONE, I. A.)
High nitrogen favors peach canker, pathologists find.
N.J. Agric., 1958, **40** (3): 7-8, illus.

Peach trees receiving excess N applications are very susceptible to infection by canker (*Fusicoccum amygdali*). Captan, thylate, ferbam and phygon have shown most promise in canker control, and should be applied at weekly intervals from delayed dormant until shuck-off periods. Fungicidal protection should also be given between mid-August and November during wet periods.

3502. FOSTER, H. H., AND RHODES, W. H.
Wettable sulfur may act as an eradicant fungicide in the control of peach scab.
From abstr. in *Phytopathology*, 1958, **48**: 343.

In replicated orchard experiments wettable S gave effective control of peach scab (*Cladosporium carpophilum*), even when the first 3 sprays of a complete schedule were omitted. Captan was much less effective.

3503. WISHART, R. L.
Modified pruning of apricots pays.
J. Dep. Agric. S. Aust., 1958, **61**: 534-6, bibl. 3, illus.

Modified pruning allows the fruit spurs to develop on secondary branches. Gummosis infection (*Eutypa* sp.) is thereby confined to the smaller branches, and infection can be cut out before it reaches a main branch. If this method of pruning is adopted while the trees are free from infection, practically all limb losses can be avoided. [See also *H.A.*, 26: 341.]

3504. MATTA, A.
Su un eccezionale attacco di ruggine dell'albicocco contenuto con trattamenti a base di zineb. (**An exceptionally severe attack of apricot rust controlled by zineb treatment.**)
Not. Mal. Piante, 1958, Nos 43/44, pp. 233-5, bibl. 4, illus.

Severe defoliation of apricot trees was caused by *Tranzschelia pruni-spinosae*, but spraying 3 times (June–August) with 0·25% zineb was followed by the production of healthy new leaves over the whole of young trees and at the ends of shoots in mature trees, whereas untreated trees remained leafless.

3505. HAMILTON, J. M., AND SZKOLNIK, M.
Control of *Coccomyces hiemalis* by systemic movement of cycloheximide semicarbazone in sour cherry following root or leaf absorption.
Abstr. in *Phytopathology*, 1958, **48**: 262.

Soil application of the semicarbazone derivative of cycloheximide provided systemic activity against the cherry leaf spot fungus (*Coccomyces hiemalis*) in 3-year-old potted Montmorency and English Morello cherries. A single soil application of 20 p.p.m. of the semicarbazone (200 ml. per 7-in. pot), or an application of 5 p.p.m. on 2 consecutive days, effectively protected the foliage against infection when inoculated on the third day following start of soil treatment. Subsequent inoculation 2 weeks later, after 8 new leaves had developed, resulted in no infection. Concentrations of 100 p.p.m. or higher resulted in short internodes and injury to the foliage. Cycloheximide was less effective and more injurious than were the derivatives at equivalent concentrations. The systemic movement and activity of the semicarbazone derivative, when applied to specific individual cherry leaves on terminals, was correlated with the concentration used, with rate of tree growth, and with age of leaves. Such movement and activity were more pronounced on trees grown in pots outdoors than on those grown in the greenhouse. Semicarbazone (20 p.p.m.) did not move in appreciable amounts from a given sprayed leaf to the next distal leaf, but was translocated to the next leaf in vascular alignment on the stem. Thus, multiple leaf spraying was essential for the systemic protection of the new growth.

3506. Lockhart, C. L.
Studies on red leaf disease of lowbush blueberries.
Plant Dis. Reptr, 1958, **42**: 764-7, bibl. 5.

The effects of temperature on growth and spore germination of *Exobasidium vaccinii* are reported. The number of infected blueberry shoots increased between the first- and second-crop years, and some of the infected shoots died each year. Infection reduced fruit set. Attempts to prevent spread of red leaf disease in the field by the use of fungicides and antibiotics have so far given negative results. The only means of control at present is eradication of diseased blueberry plants with a mixture of 2,4-D and 2,4,5-T.—Canada Dep. Agric., Ottawa.

3507. McKeen, W. E.
Blueberry canker in British Columbia.
Phytopathology, 1958, **48**: 277-80, bibl. 10, illus.

Blueberries are becoming an increasingly important cultivated crop in British Columbia. All the varieties grown were bred in New Jersey, and some of them, notably the variety Jersey, suffer severely from blueberry canker, which causes wilting and death of numerous stems on older plants and the death of many young plants. The organism responsible is *Godronia cassandrae*, but the strain attacking blueberries appears to be distinct from that causing a fruit storage rot of cranberries in the U.S.A. No effective control measures have been worked out, and sprays applied in the spring have proved ineffective. It is suggested that the pruning and burning of diseased wood and the application of fungicides in August and September should help to reduce infection.—Univ. B.C., Vancouver.

3508. Pratt, M. J.
Occurrence, behavior and control of *Verticillium albo-atrum* Reinke and Berth. in small fruits.
Diss. Abstr., 1958, **18**: 36-7, being *Publ.* 24,650 of 96 pp.

Verticillium wilt was found to be an important disease of black raspberries and strawberries during 1955 and 1956 in Oregon. Plant remains in the soil are a serious source of infection, but verticillium incidence in propagation stock was low. Complete control in the top 10 in. of soil was obtained in field trials with allyl bromide, chloropicrin, Mylone and Vapam at about 400 lb. per acre. Soil temperatures were about 65° F. at the time of application but moisture levels were low. —Ore. St. Coll.

3509. Bolton, A. T.
Control of strawberry foliage and fruit diseases.
Rep. Que. Soc. Prot. Plants, 1957, 1958, **39**: 68-70.

Of 5 fungicides tested for two years against leaf spot and leaf scorch, dithane, manzate and tricop gave the best results and, although the fruits were not sprayed, also reduced the incidence of Botrytis fruit rot. It is considered that the use of fungicides will enable strawberry plantations to be retained for a second crop.

3510. van Adrichem, M. C. J., and Bosher, J. E.
Leaf blotch and petiole blight of strawberry caused by *Gnomonia fructicola*.
Plant Dis. Reptr, 1958, **42**: 772-5, bibl. 5, illus.

Damage to strawberries caused by *Gnomonia fructicola* has only recently become severe on Vancouver Island. Leaves, petioles and inflorescences are affected, but roots are not. Recent changes in cultural practices, which are thought to accentuate losses due to *G. fructicola*, include irrigation, sawdust mulching which maintains a more humid microclimate round the plants, and ploughing in straw mulch instead of burning it.—Plant Path. Lab., Saanichton, B.C.

3511. Peng, F.-Y., and Chen, T.-W.
Studies on the control of anthracnose of grape in Changli district. [Chinese, with English summary ½ p.]
Acta phytopath. sin., 1957, **3**: 193-200, bibl. 7, illus.

Studies on the seasonal development of *Elsinoë ampelina* are reported. Rain or high atmospheric humidity promoted the development of the disease. Young vines were more susceptible than older ones. Efficient control was obtained with 3 sprays of bordeaux mixture (1—0·5—200) applied in late May (just before flowering), mid June (after 70% fruit set) and in late June to early July.—Changli Fruit exp. Stat.

3512. Ciferri, R.
Lo zineb contro l'antracnosi delle viti. **(Zineb for control of anthracnose of vines.)** [English summary 5 lines.]
Not. Mal. Piante, 1958, Nos 43/44, pp. 184-5, bibl. 1.

The descending order of effectiveness of treatments against *Gloeosporium ampelophagum* was: 0·5% zineb; 2: 1: 100 bordeaux; 0·25% zineb; 1: 1: 100 bordeaux. Only the first gave really satisfactory results.

3513. Rui, D.
Effetti favorevoli dello ziram sulla muffa grigia e sulla conservazione delle uve. **(Favourable effects of ziram on grey mould and storage of grapes.)**
Not. Mal. Piante, 1958, Nos 43/44, pp. 277-8.

Grapes from vines which had been treated with ziram for control of downy mildew were stored successfully until February for wine making, but those from vines treated with copper fungicides could not remain in storage after late December, owing to attacks of the mould fungus, *Sclerotinia fuckeliana*. It is proposed to carry out confirmatory tests.

3514. Ambrosi, M.
Contro la muffa grigia dell'uva: Un triennio di prove di lotta con il TMTD. **(Control of grey mould of grapes. Experiments with TMTD over a three-year period.)**
Not. Mal. Piante, 1958, Nos 43/44, pp. 180-3.

Two treatments in August and one in September of ripening grape bunches with a fine dust comprising 85% of sulphur and 15% of 10%-active TMTD gave almost perfect protection against *Botrytis cinerea.*

3515. Petruhina, M. T.
Trials on downy mildew control according to incubation periods. [Russian.]
Vinodelie i Vinogradarstvo, 1958, **18** (4): 27-9.

In Transcarpathia timing of 1% bordeaux sprays according to the duration of incubation periods greatly reduced downy mildew incidence on vines. In years favourable for the disease development an additional treatment should be given before the first possible attack, or alternatively 3% bordeaux should be applied 10 days before flowering.

3516. Goidanich, G.
Sperimentazione collegiale nella lotta antiparassitaria. **(Research on fungus control [in vines].)**
Progr. agric., 1958, **4**: 493, from abstr. in *Riv. Vitic. Enol.*, 1958, **11**: 198.

Notes on control of downy and powdery mildews of vines with sulphur fungicides, karathane, zineb, bordeaux mixture and certain combined treatments.

Nematodes.

(*See also* 3279, 3562k, 3638.)

3517. Meijneke, C. A. R., and Oostenbrink, M.
Tagetes ter bestrijding van aaltjesaantastingen. (***Tagetes*** **for the control of nematode infestation.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1958, **21**: 283-90, bibl. 8, illus.

After a growing period of 3–4 months *Tagetes erecta* or *T. patula* induced a marked reduction in soil populations of *Pratylenchus penetrans* and some other nematodes. The effects of 10 other crops or fallowing were much less effective. The use of *Tagetes* as green manure and as an undercrop is suggested. In general improved crop growth becomes apparent in the year after *Tagetes* has been grown. A toxic effect of *Tagetes* on crop growth has only been observed in a few cases. The practical use of *Tagetes* in ornamental gardens and nurseries is discussed.—PlZiektDienst, Wageningen.

Mites.

(*See also* 3561h, 1, 3639.)

3518. Boulanger, L. W.
Mite control in Maine apple orchards.
Me Fm Res., 1958, **6** (1): 21-4.

Results with several insecticides for control of European red and 2-spotted mites are surveyed. Trithion and Nialate gave good control of red spider and of codling moth; Nialate was also effective against apple maggot. Ovex was most effective when several sprays were applied. An effective summer combination spray for quick results is Aramite plus TEPP at normal concentrations.

3519. Daines, R. H.
Effects of fungicidal and combination sprays on apple finish and on mite populations.
From abstr. in *Phytopathology*, 1958, **48**: 261.

A 2-year study indicated that the best finish, in decreasing order, on Golden Delicious apples was obtained with the following: captan plus lead arsenate; captan plus methoxychlor; thiram plus lead arsenate; thiram plus dieldrin; captan plus dieldrin; glyodin plus lead arsenate; glyodin plus dieldrin; glyodin plus methoxychlor. Where glyodin was used in the pre-bloom and third and fourth cover sprays, where glyodin was used in the third and fourth covers and captan in all remaining sprays, or where sulphur was used alone or with captan in the pre-cover sprays and captan in remaining sprays, the finish was as good as with any combination tested. Red Delicious apples developed a fine finish from all treatments except where sulphur was used early. Fruit on the sulphur treatments developed considerable russeting of cheek and stem end and frost ring russet. Ovex [chlorfenson] was applied in all petal fall and first cover applications. Mite counts per leaf on June 28 were as follows: glyodin, 3; captan in all sprays except glyodin in pre-bloom spray and in third and fourth cover sprays, 4; captan in all sprays except glyodin in third and fourth cover sprays, 10; thiram, 12; captan, 35; and sulphur early followed by captan, 70. In a Stayman block, where all treatments received Ovex at pink and petal fall, mite populations in ascending order were as follows: Thioneb (50% polyethylene thiuram sulphide), glyodin, Cyprex (70% *n*-dodecylguanidine acetate), thiram, zineb, captan, dichlone, and sulphur.

3520. Cutright, C. R.
Reactions of different populations of *Panonychus ulmi* (Koch) to various phosphorus-based acaricides.
J. econ. Ent., 1958, **51**: 255, bibl. 1.

Observations and an experiment in apple orchards in Ohio have led to the conclusion that more than one race of parathion-resistant mites are present. One race is not resistant to demeton, whereas other races are already resistant or are in the process of becoming so.—Ohio agric. Exp. Stat., Wooster.

3521. Asquith, D.
Miticide spray effective in tests at Arendtsville.
Science for the Farmer, 1958, **5** (4): 14, illus.

Kelthane (2 lb. wettable powder in 100 gal.) gave excellent control of 2-spotted mite [*Tetranychus bimaculatus*] and Schoenei mite [*T. schoenei*] on apples.

3522. Foschi, S.
Un nuovo acaro (*Phyllocoptes fockeui* Nal. et Trt.). **(A new mite—*Phyllocoptes fockeui.*)**
Ital. agric., 1958, **95**: 144-7, illus.

The pest was first reported in Italy in 1957, and has seriously affected pear and cherry trees and both foliage and fruit of peach, but apples are rather more resistant. Summer treatments with phosphoric esters or sulphur acaricides in Italy and with 1% barium polysulphide in Germany have proved effective. Anthracine oil products are suggested for winter treatment.

3523. KRIEGLER, P. J.
The control of Bryobia mite on peaches during the "critical period" of infestation.
Dec. Fruit Gr, 1958, **8**: 146-7, illus.

Lime-sulphur at 5 or 7 gal. in 100 gal. water or ovotran, 2 lb. of 50% w.p. in 100 gal. water, may be used as winter sprays against *Bryobia praetiosa* on peach. Lime-sulphur will also assist in the control of white scale and of curly leaf.

3524. BREAKEY, E. P., AND BATCHELOR, G. S.
Biology and control of the dryberry mite, *Phyllocoptes gracilis* (Nal.).
Bull. Wash. agric. Exp. Stat. **574**, 1957, pp. 17, bibl. 8, illus.

The pest was found to be associated with the dryberry disease of loganberries, "sun scald" and hardening diseases of red raspberry and brownberry disease of black raspberry. The damage caused and the life history of the mite are described. Lime-sulphur or mineral oil sprays at dormant strength as the buds start to enlarge in the spring, and a second application at summer strength when the flower buds have formed but are not yet opened, were found to control the pest. Newer acaricides, particularly aramite and chlorobenzilate, were also effective.

3525. MÜLLER, H. W. K.
Zur Bekämpfung der Erdbeermilbe (Cyclamenmilbe) *Steneotarsonemus pallidus* (Banks 1901), 4 Beitrag. (**The control of strawberry mite (*Steneotarsonemus pallidus*), 4th report.**) [English summary 13 lines.]
NachrBl. dtsch. PflSchDienst., Braunschweig, 1958, **10**: 82-7, bibl. 19.

Kelthane is recommended for strawberry mite control, instead of endrin or chlorinated Inden. 0·15% emulsion or 0·25% suspension should be applied twice at an interval of 10 days just before flowering, or as pre- and post-blossom sprays. Endrin and chlorinated Inden are still useful as post-harvest sprays. [For an earlier report see *H.A.*, 26: 3543.]—Staatsinst. angew. Bot., Hamburg.

Insect pests.

(*See also* 3561c, i, m, o, p, s, 3562c, e, i, j, l, n, r, s.)

3526. BRANNON, D. H.
Entomology.
Wash. St. Res. Progr., 1958, No. 6, pp. 3.

Preliminary results are included on the following: 95% control of raspberry bud weevil in strawberries was obtained by row fumigation with EDB. Three strawberry varieties resistant to cyclamen mite are Puget Beauty, Silatz and a selection of Marshall. BHC, lindane, parathion, Carbide and Carbon 8305 gave effective control of garden centipedes; Telone and DD showed some fumigant effect. Furrow applications of diazinon at planting time are recommended for onion fly control. Parathion was the most effective insecticide tested for pea moth control. In limited tests dieldrin and toxaphene gave good control of pear psylla. Trithion caused damage to apples when used at 2 lb. wettable powder or 1 pint emulsion to 100 gal. water. In preliminary tests on stone fruits dieldrin, endrin and Thiodan gave good control of lygus and stink bugs, and Nialate showed promise for control of mites and aphids.

3527. ARMSTRONG, T., AND BOYCE, H. R.
Control of borers attacking peach trees in Ontario.
Publ. Ent. Div. Canada Dep. Agric. **1039**, 1958, pp. 6, illus.

Peach tree borer, *Sanninoidea exitiosa*, may be controlled by ethylene dichloride emulsion applied to the soil in October or early November, by paradichlorobenzene applied similarly in early September, or by 2 sprays of DDT applied to trunk and lower limbs July 22–25 and again August 10–12. The lesser peach tree borer, *Synanthedon picipes*, may be controlled by cultural methods or by 3 sprays of a parathion w.p. plus malathion emulsion mixture in summer. The shot-hole borer, *Scolytus rugulosus*, may be controlled by the removal of dead and dying wood and by spraying the trunk and lower limbs with DDT during the first week of June.

3528. DÜRR, H. J. R., JOUBERT, C. J., AND WALTERS, S. S.
Die uitwerking vam grontoedienings van aldrin, dieldrin en chlordaan op besmettings van die Argentynse mier (*Iridomyrmex humilis*) oor 'n periode van vier jaar. (**The effect of soil applications of aldrin, dieldrin and chlordane on infestations of the Argentine ant during a period of four years.**) [English and French summaries ½ p. each.]
S. Afr. J. agric. Sci., 1958, **1**: 75-82, bibl. 3.
WHITEHEAD, V. B.
New light on Argentine ant and mealybug.
Dec. Fruit Gr, 1958, **8**: 94-6, illus.

Insecticide and sand mixtures were mixed with soil in vineyard plots at the rate of 4 lb. technical material per morgen. Eight months after treatment the plots were free from ants and mealy bugs and control was maintained for 4 years. Soil concentrations of dieldrin and chlordane 4 years after application were more than half the original application, but aldrin concentrations were much lower. [See also *H.A.*, 27: 320.]
In the second article these results are summarized with recommendations to growers.—Elsenberg agric. Coll., and W. P. Fruit Res. Stat., Stellenbosch.

3529. HASSAN, M. S.
Testing phosphorus compounds and chlorinated hydrocarbons against aphids.
Agric. Res. Rev., 1958, **36**: 79-93.

The results of tests from 1948 to 1957 are tabulated on the effects of various insecticides on 8 species of aphid infesting many host plants, including apricot, peach, pomegranate, banana, bean, artichoke, watermelon and duranta. Fourteen phosphorus compounds and 6 chlorinated hydrocarbons gave very effective aphid control. Systox and metasystox, however, were not transported from the parent banana plants to the offshoots in sufficient concentration to kill *Pentalonia nigronervosa*.—Minist. Agric., Egypt.

3530. Kessler, B., Swirski, E., and Tahori, A. S.
Effect of caffeine and other purines upon the ribonucleic acid/deoxyribonucleic acid ratio in leaves, and the suitability of these leaves for aphids.
Nature, 1958, **181**: 1595-6, bibl. 7.

Young apple leaves showed progressive decreases in their content of deoxyribonucleic acid and increases in the ratio of ribonucleic to deoxyribonucleic acid as the concentration of caffeine, applied as spray, was raised from 25 to 100 p.p.m. The same changes occurred during natural aging of the leaves. The increase in aphid (*Aphis pomi*) populations on the leaves was approximately inversely proportional to the caffeine concentration. The application of adenine had no such effects. Populations of *A. craccivora* behaved in a similar way on bean leaves which had been treated with caffeine or xanthine. Caffeine did not act as a contact poison, nor could it have functioned as a stomach poison in the sap. Further details will be published elsewhere.—Agric. Res. Stat., Rehovot, and Israeli Inst. biol. Res., Ness-Ziona.

3531. Madsen, H. F., and Bailey, J. B.
Biology and control of the leaf curl plum aphid in northern California.
J. econ. Ent., 1958, **51**: 226-9, bibl. 6, illus.

Studies on the biology of *Aphis helichrysi* are described. The varieties Ace, Duarte, Kelsey, Tragedy and Beauty are commonly attacked, but the aphid appears to avoid Rosa and President. In control experiments oil-dinitro sprays were effective against over-wintering eggs but injured some plum varieties, notably Duarte and Kelsey. Delayed-dormant oil-phosphate sprays also killed the eggs but without injuring the trees. Of the organo-phosphorus compounds tested only Thimet [diethyl ethylthiomethyl dithiophosphate] controlled the aphids once they were within the curled leaves.—Univ. Calif., Berkeley.

3532. Stelzer, L. R., and Fluke, C. L.
Soil insecticides for plum curculio control in Wisconsin.
J. econ. Ent., 1958, **51**: 131-3, bibl. 8.

Soil treatments with aldrin and dieldrin, in both small plots and in commercial applications, gave excellent control of the plum curculio (*Conotrachelus nenuphar* (Hbst.)) [in a cherry orchard] for several consecutive years. Heptachlor also appeared promising in these tests. Wettable powder formulations applied in high gallonages of water appeared to give better control than granulated formulations. These insecticides provided more efficient control in cleanly cultivated orchards than in heavily sodded orchards. [Authors' abstract; see also *H.A.*, 28: 2410.]—Univ. Wis., Madison.

3533. Hering, M.
Weitere Versuche und Erfahrungen zur Bekämpfung des Gefurchten Dickmaulrüsslers (*Otiorrhynchus sulcatus* F.). **(Further studies and results on vine weevil control.)**
Reprinted from *Weinberg u. Keller*, 1958, **5**: 239-47, bibl. 3, illus.

In laboratory tests with adult weevils, carbazol, phosphoric acid esters and diazinon were ineffective. Sprays of DDT, parathion, chlorthion and malathion acted quickly as stomach poisons, while dusts were effective by contact action. Granular materials (based on aldrin, chlordane, and lindane+dieldrin) incorporated into the soil gave good results against adults. Soil applications of aldrin, chlordane, BHC, BHC+dieldrin and C-B-Ho were also very effective against the larvae, aldrin, chlordane and C-B-Ho being active throughout the whole growing season. Liquid application by soil injection or watering gave no better results than application of granular insecticides round the vine and its stake.

3534. Sherman, M.
Latent toxicity in the Mediterranean fruit fly and the melon fly.
J. econ. Ent., 1958, **51**: 234-6, bibl. 5.

"Latent toxicity" describes the phenomenon in which the full lethal effect of an insecticide applied to larvae does not become manifest until the insects become adult. This paper describes tests in which various chlorinated hydrocarbon and other insecticides were applied as soil treatments to the larvae of *Ceratitis capitata* and *Dacus cucurbitae*. Several chlorinated polycyclic hydrocarbon insecticides showed strong latent toxicity to *Ceratitis* and somewhat weaker latent toxicity to *Dacus*.—Hawaii agric. Exp. Stat., Honolulu.

3535. Quintanilla, R. H.
Emplazamiento de los mosqueros en función de la atracción ejercida en la mosca de los frutos (*Ceratitis capitata*). **(Placing of fly traps based on their attraction for the fruit fly, *Ceratitis capitata*.)** [English summary 8 lines.]
Rev. Fac. Agron. B. Aires, 1957, **14**: 71-5, bibl. 3.

Traps baited with wine vinegar were placed at 0·9 and 1·7 m. above soil level, facing either S.E. or N.W. The higher position was the more effective, and orientation was unimportant.

3536. Gertler, S. I., and others.
Esters of 6-methyl-3-cyclohexene-1-carboxylic acid as attractants for the Mediterranean fruit fly.
J. agric. Food Chem., 1958, **6**: 592-4, bibl. 6.

Thirty-one esters of 6-methyl-3-cyclohexene-1-carboxylic acid have been synthesized and tested as attractants for the Mediterranean fruit fly (*Ceratitis capitata*). Approximately one-fourth of the esters showed considerable attractiveness to the male of this species when tested by the olfactometer method. The most effective compounds in the field tests were esters of secondary alcohols with short chains not exceeding 5 carbons. [Authors' abstract.]—Ent. Res. Div., U.S.D.A., Beltsville.

3537. Ezzat, M. A.
A short note on the chemical control of the Mediterranean fruit fly *Ceratitis capitata* (Wied.) Diptera: Trypetidae.
Agric. Res. Rev., 1958, **36**: 119.

Excellent control on peach and pear with 4–5 sprays containing 250 g. lindane w.p., ½ litre molasses and 100 g. flour in 100 litres water.

3538. Barnes, M. M.
Walnut pest moves north.
West. Fruit Gr, 1958, **12** (5): 26-8, illus.

The distribution of walnut husk fly, *Rhagoletis completa*, is extending in California. Control measures consist of baiting, 3 oz. glycine plus 4 oz. washing soda in 1 gal. water exposed in pans suspended in the trees, followed by one or two sprays of 1½ lb. 25% malathion w.p. per 100 gal. Trials with protein hydrolysate bait sprays show promise.

3539. Ebeling, W.
Vinegar fly control treatments.
Calif. Agric., 1958, **12** (6): 12-14.

In laboratory tests 28 proprietary insecticides were evaluated against vinegar fly (*Drosophila melanogaster*). The most effective insecticides were Lethane 384 and TEPP; emulsifiable concentrates were more effective than wettable powders with all materials. In tests with inert dusts, a silica aerogel resulted in 100% mortality in 28 minutes at 75° F. and r.h. 60%.—Univ. Calif., Los Angeles.

3540. Kido, H.
Insecticides for the control of *Drosophila*.
Proc. 12th annu. Res. Conf. Calif. Fig Inst., 1958, pp. 20-1.

Laboratory tests showed that Malathion, American Cyanamid 12880, Dicapthon and Dipterex were the most promising for use in field tests in fig orchards.
J.R.L.

3541. Warner, R. M.
Field tests of insecticides and baits for control of *Drosophila* (vinegar fly).
Proc. 12th annu. Res. Conf. Calif. Fig Inst., 1958, pp. 25-31.

As a result of trials carried out during 1957 the following recommendations and statements are made: (1) A bait containing dried figs, yeast and water with Diazinon w.p. sprinkled on top attracts and kills *D. melanogaster*. (2) Malathion dust is most effective at temperatures above 75°, and the wettable powder is more effective than the emulsion. (3) Diazinon was very effective against the flies, and is probably superior to Malathion but is more expensive. (4) Pyrethrums gave a good knockdown of flies and were more effective at lower temperatures than some other insecticides. (5) Control with parathion is not considered practicable because of legal regulations. (6) Methoxychlor dust will give good control of the flies if no reinfestation is likely. (7) Trithion spray did not kill the flies but did control red spider mites. (8) Ortho 4335 dust is considered to be promising for control of vinegar flies. (9) In a test using a fog machine a mixture of DDT, Alethrin and malathion gave the best kill. A description is given of an experiment in which 14 rows of peach trees were sprayed with malathion+S and later Dieldrin+S to form a barrier to prevent the vinegar flies moving to nearby fig orchards.
J.R.L.

3542. Baggiolini, M.
La lutte contre la tordeuse de la pelure (*Capua reticulana* Hb.). **(Control of pear tortrix.)**
Rev. romande Agric. Vitic., 1958, **14**: 47-50, bibl. 5, illus.

The control measures recommended are a winter or pre-blossom spray of oleoparathion or dinitrocarbolineum for severe infestations, with a summer spray of parathion for control of the larvae. [See also *H.A.*, 27: 3318.]

3543. Jensen, F. L.
Leaf folder control.
West. Fruit Gr, 1958, **12** (6): 33-4.

Experimental results are given for several newer insecticides in the control of *Desmia funeralis* on vines. Of these, Sevin, at 1 lb. of 50% w.p. per 100 gal. or 5% dust, appears most promising. Sevin also controlled leafhopper.

3544. Allen, H. W.
Orchard studies on the effect of organic insecticides on parasitism of the oriental fruit moth.
J. econ. Ent., 1958, **51**: 82-7, bibl. 5.

Studies on the effect of organic insecticides on parasitism of the oriental fruit moth (*Grapholitha molesta* (Busck)) were made from 1948 through 1953 in peach orchards near Moorestown, N.J. In orchards not receiving such insecticides parasitism of twig-infesting larvae of the first two generations was as high as it was before they came into general use. It was highest in the orchard groups where there was no exposure and lowest in those having a heavy exposure to these insecticides. Significant reductions in parasite levels did not always follow heavy exposure to these insecticides, and after spray applications were discontinued for the season, both moth and parasite populations usually regained normal levels within a few weeks. The average reduction in parasitism, even in orchards heavily exposed, was usually less than 50%. Only the sprays applied before July 10 directly affected parasitism of the twig-infesting larvae. These included the early sprays used on peach, such as BHC, DDT, and the phosphorus insecticides used for control of the plum curculio or the oriental fruit moth, and similar sprays used on adjoining crops and orchards. There were instances in individual orchards of greatly reduced parasitism following moderate to heavy exposure to each of them. [Author's abstract; see also *H.A.*, 28: 310.]

3545. Michelbacher, A. E.
The navel orangeworm on walnuts.
Proc. 12th annu. Res. Conf. Calif. Fig Inst., 1958, pp. 19-20.

Since no known spray programme will control the navel orangeworm (*Paramyelois transitella*=*Myelois venipars*) on walnuts, which it can attack if the husks are broken, the following preventive measures are recommended: (*a*) control of codling moth to reduce damage to husks [see also *H.A.*, 27: 3313], (*b*) harvesting early before the husks begin to crack, (*c*) sanitation in the orchard to reduce the chance of reinfestation the following year.
J.R.L.

3546. Hosny, A., and Samak, M. M.
Studies on the effect of some new insecticides on *Polychrosis botrana* Schiff. (Lepidoptera-Tortricidae) in Egypt.
Agric. Res. Rev., 1958, **36**: 114-18.

Of 6 insecticides tested for control of *Polychrosis botrana*, an important pest of vines in the Nile delta, Pacol (1·5% parathion+80% mineral oil) and Didimac

(25%) DDT) were the most effective, and Diazinon w.p. (40% active) was least effective. Insecticidal treatment increased yields from 232% to 617% in the Italian variety and from 37% to 224% in the Rozaki variety.—Minist. Agric. Egypt.

3547. RJABČENKO, P.
The control of *Eulecanium bituberculatum* on apples. [Russian.]
Sad i Ogorod, 1958, No. 5, pp. 58-9.

E. bituberculatum is a serious pest of apple and other fruit trees in the Stavropol region. Recommended control measures are the creation of favourable conditions for parasites and a spray programme consisting of 5–6 applications of given combinations of bordeaux, Paris green and nicotine sulphate.

3548. DEKANOIDZE, G. I.
***Pulvinaria vitis* and its control.** [Russian.]
Vinodelie i Vinogradarstvo, 1958, **18** (3): 26-7, illus.

In Western Georgie the scale *P. vitis* attacks both cultivated and rootstock varieties of vine and also some other fruit crops. When spray applications of thiophos, metaphos and DDT emulsion were tested, 0·15% thiophos + 1% DDT emulsion and 0·25% metaphos were found to give the most effective control. Three applications at 10-day intervals should be made, starting when the larvae emerge, during the second half of June.

Other pests

See 3562u, 4173.

Fungicides and insecticides.

(*See also* 3273, 3561f, r, w, y, 3562h, m, 4034.)

3549. SOCIETÀ ITALIANA DI FITOIATRIA.
Atti del terzo convegno sugli anticrittogamici acuprici, Alba, 20 novembre 1957. **(Proceedings of the third conference on non-copper fungicides, Alba, 20th November, 1957.)**
Not. Mal. Piante, 1958, Nos 43/44, pp. 340, bibls, illus.

This double number of the journal is confined to papers on non-copper fungicides, grouped in sections covering (1) chemistry and laboratory tests, (2) practical application (mainly to vines), (3) side effects, and (4) miscellaneous aspects. A few of the papers have brief English summaries. Points from those on downy mildew of vines are summarized below; the others of horticultural interest, on vines, tomatoes, apples, stone fruits, olives, peppermint and bananas, are abstracted or noted separately.

Of the non-copper fungicides, zineb is clearly the most widely used for control of downy mildew of vines. Sprayed at 0·2–0·3% it gives excellent protection to the foliage and good protection to the fruit. In addition, it improves vegetative growth, fruit set, fruit size and yield, giving earlier ripening and thinner skinned fruit than that from bordeaux-treated vines. In some cases leaf fall is apparently advanced by zineb, but not to the detriment of wood ripening, and the effect is actually due to late attacks of downy mildew, controllable by extending zineb treatment beyond harvesting time, or to powdery mildew, controllable by sulphur. A sulphur/zineb preparation (Aspor 60–30–10) has given excellent results and, like most zineb preparations, has increased the sugar content of the must. Ziram is less effective than bordeaux and considerably inferior to zineb in protecting vine leaves from downy mildew, but has given good protection of the fruit. Leaf fall was latest with zineb/copper or zineb/karathane preparations and earliest with maneb and captan. Cases of dermatitis have been reported among employees spraying zineb.

3550. ROJATTI, G.
Zineb e fotosintesi. **(Zineb and photosynthesis.)**
Not. Mal. Piante, 1958, Nos 43/44, p. 333.

The superior vegetative growth of vines and fruit trees treated with zineb instead of copper fungicides, particularly bordeaux mixture, is attributed to the fact that photosynthesis is reduced by the opacity of the latter and by the deposit left on the foliage, whereas the non-copper product does not reduce the intensity of light or the supply of air available for photosynthesis.

3551. BALDACCI, E., AND BONOLA, P.
A proposito del maggiore sviluppo vegetativo delle viti trattate con zineb. Esame della attività dello zineb al test Avena. **(Concerning the increased vegetative growth of vines treated with zineb. Application of the *Avena* test to the action of zineb.)** [English summary 6 lines.]
Not. Mal. Piante, 1958, Nos 43/44, pp. 282-7, bibl. 10.

The growth-promoting effect of zineb on vines was proved not to be due to any hormonal action. The possible beneficial action of its Zn content needs investigation.

3552. DE ROSA, M.
La vegetazione di viti colpite dal gelo e protette con zineb o con poltiglia bordolese. **(Vegetative growth of vines damaged by frost and protected by zineb or by bordeaux mixture.)**
Not. Mal. Piante, 1958, Nos 43/44, pp. 279-81, illus.

Vines which had been pruned to remove frost-damaged shoots were treated from June to August with 0·15% to 0·25% zineb and 0·15% colloidal-sulphur, the controls receiving only 1% bordeaux mixture. The zineb-sulphur treatment gave a 10% higher fruit yield after much more vigorous vegetative growth than the copper-treated vines. In another experiment with vines suffering from both frost and phylloxera, the zineb-sulphur treatment was greatly superior to the copper treatment in promoting shoot growth and, contrary to many results reported elsewhere, in postponing leaf fall. In both cases the fruit ripened earlier than with copper treatment. Downy mildew was satisfactorily controlled by both treatments.

3553. BERTOSSI, F., AND PICCO, D.
Zineb, ziram e nabam al teste lupino. **(Zineb, ziram and nabam subjected to the lupin test.)**
Not. Mal. Piante, 1958, Nos 43/44, pp. 293-301, bibl. 6.

Commercial zineb (66% active substance) had a temporary growth-inhibiting action on lupin seedlings when used at concentrations of 10^{-3} or 10^{-4}, and its delaying action on emergence of lateral roots was also apparent at 10^{-5}; the purified product, however, slightly stimulated root development at 10^{-3}–10^{-6}. None of these effects could be produced by stale zineb solutions. Similar results were obtained with ziram, which was slightly more toxic at the higher concentrations. Nabam was permanently toxic even at 10^{-5} and inhibited root growth at 10^{-6}.

3554. CARLONE, R.
Colorazione delle mele dopo trattamenti con Captano. (**Colouring of apples after treatments with captan.**)
Not. Mal. Piante, 1958, Nos 43/44, pp. 302-3.

Fruit of Delicious and Golden Delicious apples from trees sprayed with captan 3 times during August and September had thinner skin, deeper colour and less russeting than those not treated, and ripened 20–30 days earlier. The keeping quality was unaffected. [For a detailed account see *H.A.*, 28: 2437.] The following year trees of the same varieties were treated from petal-fall to the end of June with captan, ziram, Nirit, Thiotox or a zineb preparation. With every product except one [not specified], fruit colour was intensified, and on one captan-treated plot where 2 extra later treatments were given, the colour was particularly intense.

3555. HILBORN, M. T., BOULANGER, L. W., AND COOPER, G. R.
The effect of some pesticides on the chemical composition of McIntosh apple leaves.
Plant Dis. Reptr, 1958, **42**: 776-7, bibl. 3.

Analytical data suggest that spray injury from lead arsenate and glyodin-lead arsenate in combination may be due to the presence of arsenic acid and 2-heptadecylglyoxalidine arsenate, and may also be due in part to a decrease in the Fe–Mn ratio in apple leaves.—Me agric. Exp. Stat., Orono.

3556. JERNSTEDT, M. L., AND MUMFORD, D. C.
Charges for commercially applied pesticides.
Bull. Ore. agric. Exp. Stat. **566,** 1958, pp. 27, illus.

This bulletin provides economic data on the various methods of application, the types of pests, weeds and diseases attacked, the chemicals used, and treatment of 10 crops including cherries, filberts, strawberries, beans and peas.

3557. ANDERSON, L. D., AND ATKINS, E. L., Jr.
Toxicity of pesticides to honey bees in laboratory and field tests in Southern California, 1955-1956.
J. econ. Ent., 1958, **51**: 103-8, bibl. 4.

Of 33 compounds tested in the laboratory 10 (mostly phosphates) were found to be more toxic than the standard DDT treatment, 4 were about as toxic as DDT, and the rest (mostly phosphates) were practically non-toxic to bees. Sabadilla at dosages comparable to those used on citrus was non-toxic to bees, while dosages comparable to those used on vegetables were highly toxic. Studies on DDT, toxaphene and sulphur, alone and in various combinations, showed that DDT was moderately toxic to bees and that sulphur and toxaphene were only slightly toxic. [From authors' abstract.]—Univ. Calif. Citrus Exp. Stat., Riverside.

3558. MULLER, W. H.
The influence of antibiotics on micro-organisms causing fruit and vegetable rots.
Amer. J. Bot., 1958, **45**: 183-90, bibl. 33.

Biological spectra for certain antibiotics are presented, using various plant pathogenic micro-organisms. Streptomycin and neomycin had no influence on the fungi used; eulicin, candicidin, nystatin, filipin, amphotericin B and candidin were effective against many of the fungi but not against the bacteria; and thiolutin was both antibacterial and antifungal. [From author's summary.]—Univ. Calif., Santa Barbara Coll., Goleta.

Spray residues.

(*See also* 3561g, k, 3562f.)

3559. GRIGGS, W. H., AND HARRIS, R. W.
Further studies on the effect of spray and dust materials on russeting of Bartlett pears.
Proc. Amer. Soc. hort. Sci., 1958, **71**: 45-56, bibl. 1, illus.

The results obtained in 1955 and 1956 corroborated those of 1953 and 1954 [see *H.A.*, 26: 353] in failing to show any commercially important differences in the amount of russet formed on pears treated with Cu or streptomycin for fire blight control or given no treatment. Sprays used to control scab, insects and mites also had no effect on russeting. Less russeting developed when flowers and young fruit were protected by cloth bags, the reduction being proportional to the length of time the fruit was covered.—Univ. Calif., Davis.

3560. MITCHELL, A. E., AND KRETCHMAN, D. W.
Relationship of spray chemicals and cold injury to russeting of Golden Delicious apples.
Trans. Ill. St. hort. Soc., 1957, 1958, **91**: 43-8.

Freezing temperatures near the time of bloom, certain pesticide chemicals and certain methods of application are interacting factors causing russeting of certain varieties of apple. Captan, Niacide M and thylate caused less damage than glyodin or ferbam. Airblast application caused less damage than the use of a hand gun. [See also *H.A.*, 28: 2318.]

Noted.

3561.

a ANON.
Ziram and ferbam control peach leaf curl in California.
Agric. Newsl., 1958, **26** (3): 7.
At least as effectively as bordeaux in late autumn applications.

b ARK, P. A., AND BINGHAM, D. J.
Response of pear and cherry rootstocks to streptomycin and tetracycline when applied to control crown gall.
Plant Dis. Reptr, 1958, **42**: 673-4.
A 60 min. dip was unsatisfactory for control of the incipient form of crown gall.

c Armstrong, T.
Control of grape insects in Ontario.
Publ. Canada Dep. Agric. **1038,** 1958, pp. 9, illus.
Chiefly *Erythroneura* spp., controlled by DDT.

d Baldini, E.
La difesa degli alberi da frutto dalle gelate primaverili. **(Protection of fruit trees from spring frosts.)**
Inf. fitopat., 1958, **8**: 108-16, illus.
A review.

e Bl—, —.
Die Sprühfleckenkrankheit der Kirschbäume. **(*Cylindrosporium padi* on cherry trees.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 362-4, illus.
Control by captan.

f Bočarova, L. P., and Ukrainec, N. S.
The effect of organic-phosphorus insecticides on ascorbinoxidase. [Russian, with English summary 6 lines.]
Biohimija, 1958, **23**: 388-9, bibl. 4.
Inhibitory action of 5 compounds on the activity of ascorbinoxidase of apple leaves *in vitro.*

g Bosch, E.
Berostungen der Fruchthaut bei Äpfeln und ihre Ursachen. **(Russeting of apple fruit skin and its causes.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 265-72, 292-8, bibl. in text, illus.
See *H.A.*, 28: 1309.

h Boulanger, L. W.
The effect of European red mite feeding injury on certain metabolic activities of Red Delicious apple leaves.
Bull. Me agric. Exp. Stat. **570,** 1958, pp. 34, bibl. 20.
See *H.A.*, 27: 3296.

i Boulanger, L. W., and Forsythe, H. Y.
A report on the apple leaf-curling midge.
Me Fm Res., 1958, **6** (1): 13-16.
Control of *Dasyneura mali* by DDT (2 lb./100 gal.) in the petal-fall spray.

j Bovey, R.
État actuel des connaissances sur les maladies à virus de la vigne. **(The present state of knowledge on virus diseases of vine.)**
Vitis, 1958, **1**: 237-56, bibl. 80, illus.
A review, including some control measures.

k Bruce, R. B., Howard, J. W., and Zink, J. B.
Determination of diphenylamine residues on apples.
J. agric. Food Chem., 1958, **6**: 597-600, bibl. 4.

l Collyer, E.
Some insectary experiments with predacious mites to determine their effect on the development of *Metatetranychus ulmi* (Koch) populations.
Ent. exp. appl., 1958, **1**: 138-46, bibl. 7.
Suppression by *Typhlodromus tiliae* and *T. finlandicus.*

m Cosolo-Giussani, A.
Prove di lotta contro la fillossera gallecola della vite. **(Experiments on control of phylloxera of vines.)**
Not. Mal. Piante, 1958, Nos 43/44, pp. 290-2, bibl. 4.
Captan at 0·2–0·4% was ineffective.

n Creelman, D. W.
Fusicoccum canker of the highbush blueberry especially with reference to its occurrence in Nova Scotia.
Plant Dis. Reptr, 1958, **42**: 843-5, bibl. 14.
No control achieved of an organism which also causes end rot of cranberries.

o Entomological Branch, N.S.W. Department of Agriculture.
San José scale (*Quadraspidiotus perniciosus*). Frosted scale (*Eulecanium pruinosum* (Coq.)).
Agric. Gaz. N.S.W., 1958, **69**: 203-4, 205-6, illus.
Control on stone and pome fruits.

p European and Mediterranean Plant Protection Organisation.
Report of the international conference on oriental fruit moth and San José scale. [English and French.]
[*Publ.*] *Eur. Plant Prot. Org.*, 1957, pp. 15.
The conclusions and recommendations of the conference, with notes on incidence and control.

q Farabee, G. J., and Lockwood, J. L.
Inhibition of *Erwinia amylovora* by *Bacterium* sp. isolated from fire blight cankers.
Phytopathology, 1958, **48**: 209-11, bibl. 6.
See *H.A.*, 27: 2271 for preliminary abstract.

r Fisher, D. V., and Porritt, S. W.
Effects of a ryania-glyodin spray schedule in British Columbia upon storage quality [of apples].
From abstract in *Rep. Canad. Cttee Fruit Veg. Pres. for 1957*, 1958, p. 3.
See also *H.A.*, 28: 328.

s Fox, C. J. S., and Jaques, R. P.
Note on the green-muscardine fungus, *Metarrhizium anisopliae* (Metch.) Sor., as a control for wireworms.
Canad. Ent., 1958, **90**: 314-15, bibl. 4.

t Granhall, I.
Äppelmjöldaggen. **(Apple mildew.)** [English summary 6 lines.]
Sver. pomol. Fören. Årsskr. 1957, pp. 17-22, bibl. 7, illus.
In Swedish experiments karathane at 0·12% has given good control.

u HARRISON, B. D.
Raspberry yellow dwarf, a soil-borne virus.
Ann. appl. Biol., 1958, **46**: 221-9, bibl. 11, illus.
Symptoms and isolation.

v HEYNS, A. J.
The control of *Fusicladium* in apples and pears.
Spray programme for the control of apple scab, 1958/59.
Spray programme for the control of pear scab. 1958/59.
Dec. Fruit Gr, 1958, **8**: 142-4.
Including recommendations when prolonged rain has caused conditions favourable to scab.

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The deposition of wind-borne oil droplets on various horizontal surfaces. [French, German and Spanish summaries, 11 lines each.]
J. agric. Engng Res., 1958, **3**: 131-6, bibl. 16, illus.
Deposits on various horizontal surfaces exposed to oil sprays in the field and in a wind tunnel examined and compared.

x KIENHOLZ, J. R.
Pear virus troubles.
Bett. Fruit, 1958, **52** (9): 9, 17, bibl. 6.
Losses due to stony pit and vein yellows, selection of virus-free stock and rootstock effects.

y KOCH, H.
Anerkannte Pflanzenschutzgeräte und -geräteteile (Auszüge aus den Prüfungsberichten 1957). I. (**Recognized spraying machines and parts of machines (extracts from reports of tests 1957). I.**)
NachrBl. dtsch. PflSchDienst., Braunschweig, 1958, **10**: 113-20, illus.
With descriptions and illustrations.

z KOVÀCS, A.
La muffa grigia causata dalla *Botrytis cinerea*. (**Grey mould caused by *Botrytis cinerea*.**)
Ital. agric., 1958, **95**: 79-81.
Captan at 0·2–0·5%, the bromo-chloro-oxyquinoline dust product B 500 and 0·1–0·5% Ceresan have given good control.

3562.

a KRIMBAS, B.-D.
La dégénérescence infectieuse de la vigne en Grèce. (**Infectious degeneration of the vine in Greece.**)
C.R. Acad. Agric. Fr., 1958, **44**: 382-3.
Symptoms and varietal resistance.

b MCKEEN, W. E.
Races of and resistance to *Phytophthora fragariae*.
Plant Dis. Reptr, 1958, **42**: 768-71, bibl. 10.
In strawberry and loganberry varieties. [See also *H.A.*, 28: 2377.]

c MALBRUNOT, P., AND RICHARD, M.
Résultats obtenus au printemps 1957 dans la lutte contre la pyrale de la vigne en Champagne. (**Results obtained during spring 1957 on control of the vine pyralid moth in Champagne.**)
Progr. agric. vitic., 1958, **149**: 175-9, and **150**: 37-41.
Sprays of parathion or DDT in May controlled *Sparganothis pilleriana* on vines.

d MARROU, J.
Efficacité de quelques fungicides dans la lutte contre la pourriture des fraises, *Botrytis cinerea* Pers. (**The efficiency of certain fungicides for control of grey mould of strawberries.**)
Rev. hort. Paris, 1958, **130**: 1826-7, bibl. 8, illus.
Five applications of thiram (3·2 g./litre) or captan (2·5 g./litre) controlled *Botrytis* on strawberries without adversely affecting yields.

e MARTELLI, G. M.
Esperimenti di lotta contro la *Monosteira unicostata* Muls. et Rev. (**Experiments on control of *Monosteira unicostata*.**) [English summary 8 lines.]
Ann. Sper. agrar., 1958, **12**: 473-80, bibl. 2, illus.
For another account see *H.A.*, 28: 1276.

f MARTIN, J. T., AND BATT, R. F.
The determination of DDT in plant materials and soil.
Analyst, 1958, **83**: 340-4, bibl. 11.
Two methods used at Long Ashton for foliage, fruit, etc. [See also *H.A.*, 28: 333.]

g MEIER, G.
Der Einfluss von Blütenfrostschäden auf den Ertrag verschiedener Obstarten, Sorten und Baumformen auf dem Obstversuchsfeld Prussendorf. (**The effect of frost damage to flowers on yield of several fruit species, varieties and tree forms in the Prussendorf fruit trial ground.**)
Dtsch. Gartenb., 1958, **5**: 129-32, bibl. 5.
Spindle-bush forms were more frost-susceptible than standards.

h MINISTRY OF AGRICULTURE, LONDON.
Chemical compounds used in agriculture and food storage in Great Britain. User and consumer safety. Advice of Government departments.
[*Mimeo. Publ.*] *Minist. Agric. Lond.*, 1958, pp. 28.
A collection of 24 loose leaflets, issued in 1957 and 1958, concerned with precautions in the use of chemicals, mostly insecticides.

i MINISTRY OF AGRICULTURE, LONDON.
Millepedes and centipedes.
Adv. Leafl. Minist. Agric. Lond. **150**, revised 1958, pp. 4, illus.
Descriptions, and control measures for millepedes.

j Ministry of Agriculture, London.
Plum aphids.
Adv. Leafl. Minist. Agric. Lond. **34,** revised 1958, pp. 4, illus.
Control of the leaf curling plum aphid (*Brachycaudus helichrysi*), the mealy plum aphid (*Hyalopterus pruni*) and the damson-hop aphid (*Phorodon humuli*).

k Minz, G.
Root-knot nematodes, *Meloidogyne* spp. in Israel.
Spec. Bull. Israel Minist. Agric. **12,** 1958, pp. 10, bibl. 16.
A list of host plants classified under 6 spp. of *Meloidogyne*.

l Porter, B. A.
The eastern tent caterpillar.
Leafl. U.S. Dep. Agric. **161,** 1958, pp. 5, illus.
Life history and control of *Malacosoma americana* on apple and other rosaceous plants.

m Rossini, R.
Aspetti della meccanizzazione nel settore dei trattamenti alle colture arboree. **(Aspects of mechanization in connexion with [spray] treatment of tree crops.)**
Inf. fitopat., 1958, **8**: 135-8, illus.
Features and advantages of atomizer equipment.

n Schmidt, M.
Der Einfluss der Temperatur auf Schlüpfzeitpunkt und Flugaktivität des Apfelwicklers (*Carpocapsa pomonella* L.). **(The influence of temperature on time of emergence and flying activity of the codling moth.)** [Russian and English summaries 13 and 9 lines respectively.]
Arch. Gartenb. 1958, **6**: 12-22, bibl. 13, illus.
Prediction of the period of maximum flight. [See also *H.A.*, 27: 2314.]

o Schmitt, N.
Über den derzeitigen Stand der Massnahmen zur Austriebsverzögerung zum Zwecke des Frostschutzes. **(The present position with regard to measures for delaying bud-burst as a means of frost protection.)**
Reprinted from *Weinberg u. Keller*, 1958, **5**: 218-19, bibl. 4.
A brief review.

p Schmitt, N.
Schutz empfindlicher Pflanzen vor dem Erfrieren durch Veränderungen der ph-Zahl des Zellsaftes. **(The protection of susceptible plants from freezing by changing the pH value of the cell sap.)**
Reprinted from *Weinberg u. Keller*, 1958, **5**: 215-17, bibl. 5.
A review.

q Schweizer, H.
Beiträge zur Biologie des Kirschen- und des Pfirsichschorferregers (*Fusicladium cerasi* (Rabh.) Sacc., *Venturia cerasi* Ad. und *Cladosporium carpophilum* v. Thüm.). **(Contributions to the biology of the causal agents of cherry and peach scab.)** [English summary 1½ pp.]
Phytopath. Z., 1958, **33**: 55-98, bibl. 46, illus.
Found to be two separate species. Their biologies on different species of *Prunus* are discussed.

r Smith, L. M., Allen, W. W., and Lange, W. H., Jr.
Strawberry leaf miner damage.
Calif. Agric., 1958, **12** (7): 12-13, illus.
Natural control of *Tischeria* sp. by various parasites; nicotine sprays should be used with great discrimination.

s Stagg, S. B.
An experiment in fogging a dried fruit storage room.
Proc. 12th annu. Res. Conf. Calif. Fig Inst., 1958, pp. 14-17.
Aerosol application of pyrethrins+piperonyl butoxide for control of pests of stored raisins.

t Verner, L.
Defects of Stanley prune in Idaho.
Fruit Var. hort. Dig., 1958, **12**: 53-4, bibl. 5, illus.
Lop-sided fruit is possibly a climatic effect.

u Wolfe, H. R.
Orchard mouse control with endrin sprays.
Ext. Circ. St. Coll. Wash. **282,** 1957, pp. 6.
See *H.A.*, 28: 321.

WEEDS AND WEED CONTROL.

General.

(*See also* 3621c, e-g, i, k, m, 4163, 4184, 4189.)

3563. Wolfe, H. H., and Fanning, P. K.
Weed control with irrigation weed screens.
Ext. Circ. St. Coll. Wash. Ext. Serv. **280,** 1957, pp. 7, illus.

To prevent weed seed dispersal by irrigation water the ditchbanks should be kept clean and 40 to 60 mesh copper screens placed at points in the distribution system.

3564. Palfrey, G. D.
1957 Nova Scotia weed control report.
Proc. 11th Mtg east. Sect. nat. Weed Cttee Canada, 1957, 1958, pp. 20-36.

This report includes detailed results of experiments on weed control in lettuce, cabbage, turnip, parsnip, strawberry, blueberry and lawns.—From *Weed Abstr.*, 7, No. 1052.

3565. Putnam, N. F. (Chairman).
Proceedings of the Ninth Western Canadian Weed Control Conference, 1957,
Victoria, B.C., pp. 53.

This publication includes general surveys of weed control in bulbs and other ornamentals, tree- and small-fruit crops and vegetables, and of the control of specific weeds. In one paper new herbicides are appraised and in another the role of universities in weed control research is discussed. The acreage treated and the amount of materials used in Western Canada in 1957 are given, and weed control work in the 4 Provinces is briefly reviewed.

Particular herbicides.

(*See also* 3621h.)

3566. Minarik, C. E.
Future chemicals for weed control.
Proc. 14th N. centr. Weed Control Conf., 1957, pp. 1-5.

A review of chemicals and mixtures of chemicals likely to be of use in future weed control. Simazin at 6 lb./ac. proved non-injurious to tomatoes when applied after transplanting. When applied pre-emergence at 2 lb./ac. it was damaging to red beet, carrot, cauliflower, lettuce, mustard, onion, pea, spinach and some other crop plants. Weeds susceptible to simazin are listed. Oils fortified with hexachloroacetone have given better control of Johnson grass than oils alone. 1,2,4,5-tetrachlorobenzene appears to be highly specific for dormant wild oats and cereals and is active against a number of species in the growing stage. Crops tolerant to it include peas and navy beans. Some weeds susceptible to 8 lb./ac. of 2,3,6-TBA are listed.—From *Weed Abstr.*, **7**, No. 970.

3567. Welker, W., and others.
Response of crops and weeds to several granular herbicides.
Proc. 14th N. centr. Weed Control Conf., 1957, pp. 46-7.

Granular herbicides, based on vermiculite or clay, were applied pre-emergence to snap beans and red beets, and post-emergence to 1-year transplant conifers of 4 species, 3 varieties of strawberries and cranberries. The weeds present are listed. Promising results in beans and beets were shown by CIPC at 8 and 16 lb./ac., simazin 1 and 2 lb./ac. and CDEC 4 and 8 lb./ac., in conifers by diuron 2 lb./ac., in strawberries by CIPC 5 lb./ac. and simazin 2·4 lb./ac. and in cranberries by simazin 2 and 4 lb./ac. Other treatments showing good weed control, but severe crop injury or inadequate weed control in the respective crops are given. Dinoseb and CIPC applied post-emergence to beans and beets at the first true leaf stage caused burning of the leaves within 48 hrs; simazin and diuron injured beans within 10 days. All chemicals used showed much longer residual effects than when applied as sprays.—From *Weed Abstr.*, **7**, No. 858.

3568. Jasmin, J. J.
Field notes on herbicides for machine tabulation.
Proc. 11th Mtg east. Sect. nat. Weed Cttee Canada 1957, 1958, pp. 51-2.

Mylone applied pre-emergence at 100–300 lb./ac. was found to be safe on snap bean, pea, onion, cabbage, tomato and celery. *Simazin* appeared to be selective in pea, tomato, turnip, cabbage, lettuce, cauliflower and possibly strawberry; beans were sensitive. *EPTC* applied pre-emergence at 5–10 lb./ac. was found to be safe in asparagus, snap bean, onion, turnip, lettuce, cucumber, tomato and strawberry, but damaged cauliflower. The reaction of weeds to the herbicides was also noted.—From *Weed Abstr.*, **7**, No. 1035.

3569. Rogers, B. J.
Chlorosis and growth effects as induced by the herbicide 3-amino-1,2,4-triazole.
From abstr. in *Proc. 14th N. centr. Weed Control Conf. 1957*, p. 9.

The inhibition of plastid development by amino triazole (ATA) rather than of chlorophyll synthesis appears to be the cause of chlorosis. There is evidence that ATA at 10 M^{-3} does not inhibit incorporation of glycine into porphyrin rings or prevent the formation of chlorophyll from protochlorophyll. At 10 ^{4} M, ATA increased growth of carrot tissue by 40%; at 10^{-6} M growth was reduced by 60%.—*Weed Abstr.*, **7**, No. 997.

3570. den Boer, W.
Beschadiging door natriumchloraat. (**Damage due to sodium chlorate.**) [English summary 8 lines.]
Tijdschr. PlZiekt., 1958, **64**: 144-9, bibl. 17, illus.

Damage by sodium chlorate to vines, lettuces, cucumbers, tomatoes and cauliflowers is described. There was a difference in the susceptibility of these crops to damage, and a seasonal effect was also observed with young plants. Recovery of the plants may be hastened by washing out sodium chlorate from the top soil.—Proefst. Groent. Fruit. Glas, Naaldwijk.

3571. Mohs, H.-J.
Erfahrungen mit dem Wuchsstoffherbizid 2,4-dichlorphenoxyäthylsulfat in Gemüse-, Zierpflanzen- und Erdbeerkulturen. (**Experiences with the growth-substance herbicide 2,4-dichlorophenoxyethyl sulphate in vegetable, ornamental and strawberry crops.**)
Angew. Bot., 1958, **32**: 1-7, bibl. 9.

Plant species differed widely in sensitivity to this herbicide, and its effects were governed not only by the rate of application but also by the humus content of the soil. Where this was low, 2·5–3·5 kg. in 1,000 l. of water per ha. gave good control of weeds, but rates of 3·5–5 kg. per ha. were necessary on soils moderately to very rich in organic matter. Few crop plants, however, were completely unaffected by applications of more than 5 kg. per ha. This herbicide is not suitable for carrots or peas growing in low-humus soils, or for onions or leeks in any soil. Strawberry plants showed yellow spotting and some necrosis of the leaves when night frost followed treatment, but were otherwise undamaged. Young plants of *Tagetes* were severely injured by 2·5 kg. per ha., but lily of the valley plants 10–15 cm. high and 2 years old were undamaged at 5 kg. per ha.

3572. Coulter, L. L.
Inverton 245.
Down to Earth, 1958, **14** (1): 2-3, illus.

Inverton 245 is a formulation of 2,4,5-T in which the emulsion is water-in-oil. This reduces spray drift and increases deposit. Aerial spraying can be effectively employed but, for ground spraying, the length of hose which may be used is limited to 100 ft, 50 ft being most satisfactory. Spray pressures exceeding 200 psi should not be used.

3573. SIGALOV, B. JA.
A valuable herbicide from waste waters. [Russian.]
Priroda, 1958, **47** (5): 87-9, bibl. 2, illus.

Waste water from chemical and black metal industries containing 8–12% thiocyanates (sodium and ammonium) is a useful non-selective herbicide for control of vegetation in overgrown ditches, forest clearings, railway lines, road verges and paths in gardens and parks and for the destruction of undesirable trees and shrubs. In the Main Botanic Garden of the Academy of Sciences, Moscow, 9% sodium thiocyanate (1–2 l. of waste water per sq. m.) gave season-long control of weeds on garden paths. This compound had a quicker effect on broad-leaved weeds than on grasses, but of over 40 species observed none was resistant. Industrial production of dry concentrated thiocyanates is suggested.

Control of aquatic weeds.

(*See also* 3621 l.)

3574. GRIGSBY, B. H.
Further observations on the use of pelleted herbicides for the control of aquatic weeds.
From abstr. in *Proc. 14th N. centr. Weed Control Conf., 1957*, p. 32.

2,4-D (esters and acid), diuron, CDEC, amino triazole (ATA), polychlorobenzoic acids (ester), endothal and fenuron were each applied as 10% formulations on attaclay, bentonite or vermiculite, at 20 and 40 lb./ac. active ingredient. Against species of *Potomageton*, *Myriophyllum*, *Najas*, *Ceratophyllum*, *Vallisneria* and *Heteranthera* esters of 2,4-D, 2,4,5-TP and polychlorobenzoic acids gave best results. All herbicides gave seasonal control except with *Heteranthera* and *Vallisneria* sp., August treatments being most effective. 100% control of filamentous and unicellular green and blue-green algae was given by simazin, diuron, 2,4,5-TP and Phygon (2,3-dichloro-1,4-naphthoquinone on charcoal), at 10–40 p.p.m.; ATA and CDEC at 20 and 40 p.p.m., and fenuron at 40 p.p.m.; endothal gave no kill. [For earlier work see *H.A.*, 28: 345.]—*Weed Abstr.*, **7**, No. 924.

3575. BOWERS, C. C.
Aquatic weeds in Kentucky and preliminary research with certain herbicides used for their control.
From abstr. in *Proc. N. centr. Weed Control Conf., 1957*, pp. 31-2.

Kuron [2,4,5-TP (ester) 42·8% acid equivalent] and Radapon (dalapon) showed promise as a safe replacement for sodium arsenite for aquatic weed control.—From *Weed Abstr.*, 7, No. 923.

3576. WALKER, C. R.
Results of some experiments in the control of certain aquatic weeds in Missouri farm ponds.
From abstr. in *Proc. 14th N. centr. Weed Control Conf., 1957*, pp. 30-1.

A method of field testing new aquatic herbicides is described, in which ponds are divided into sections by vinyl plastic curtains, thus allowing plot replication. Simazin pellets showed promise for control of aquatic weeds with no toxic effects on fish or fish food.—*Weed Abstr.*, 7, No. 922.

Control of particular species.

3577. CUMMING, B. G., AND HAY, J. R.
Light and dormancy in wild oats (*Avena fatua* L.).
Nature, 1958, **182**: 609-10, bibl. 5.

"These experiments show that, under artificial conditions, white, blue and infra-red radiation inhibit germination of partially dormant wild oats. Under natural conditions, daylight inhibits the germination of partially dormant wild oats on the soil surface; cultivations that bury such seed may therefore favour increased germination. Recent field tests have shown that, when autumn tillage was practised, wild oats germinated earlier and in greater numbers the following spring."—Bot. Plant Path. Lab., Sci. Serv., Ottawa, and Field Husb. Div., exp. Fms Serv., Ottawa.

3578. BRITISH COLUMBIA DEPARTMENT OF AGRICULTURE, FIELD CROPS BRANCH.
Wild oats.
[*Publ.*] *Dep. Agric., B.C.*, 1958, pp. 2.

Wild oats in peas and beet may be controlled by IPC at 5–6 and 4–6 lb./acre respectively, lightly harrowed in before seeding. In beet CIPC at 4 lb./acre may also be used.

3579. WESTMORELAND, W. G., AND KLINGMAN, G. C.
Poison ivy, oak and sumac; identification and control.
Ext. Folder N.C. agric. Ext. Serv. **144**, 1958, 1 folded sheet, illus.

Rhus radicans, *R. toxicodendron* and *R. vernix* control by careful spraying with 2,4-D, amino triazole, ammate or sodium chlorate, or by stump treatment with 2,4-D in kerosene or fuel oil, or ammate.

3580. KENTEN, R. H.
Bracken thiaminase.
A.R. Rothamsted exp. Stat. 1957, 1958, pp. 242-51, bibl. 23.

Although the investigations have as yet produced no results of immediate practical value for the eradication of bracken, a start has been made on the synthesis of compounds which may be of value, and a good deal of information about the thiaminase system has been obtained. New techniques for studying thiaminase action have been developed, and the information obtained by these methods will help to elucidate the physiological role of thiaminase. In particular, the investigations have shown that ABMT [3-(*o*-aminobenzyl)-4-methylthiazole] is a powerful inhibitor of thiaminase *in vitro*, although it is apparently without effect on the bracken plant. Further studies of compounds having a close structural resemblance to ABMT would appear to be worth while, as the availability of compounds which would inhibit thiaminase *in vivo* might help to throw light on the role of this enzyme and might also be useful as bracken-killing agents. [Author's conclusion.]

Weed control in fruit crops.

(*See also* 3437.)

3581. Nilsson, F.
Bekämpning av ogräs i fruktodlingar. **(Weed control in orchards.)**
Sver. pomol. Fören. Årsskr. 1957, pp. 5-9, bibl. 3, illus.

In 3 small-scale tests on weed control (particularly of couch grass) in apple orchards 6 herbicides were compared. Weed control by arsenic compounds was most effective. Sodium and potassium chlorates gave moderate control at 250 kg. or 400 kg. per ha. Control with TCA was poor, and trees were injured. Dalapon applications were more effective in September than in July.

3582. Schubert, O. E., and Amato, V. A.
Chemical weed control—is it practical for young orchards?
Science serves your Farm, being *Bull. W. Va agric. Exp. Stat.* **393** (3), 1957, pp. 4-5, illus.

Preliminary results indicated that dalapon, monuron and amino triazole greatly reduced weed growth when used at high rates of application. Dalapon and monuron were too toxic for use in peach orchards but no damage to apple trees was observed.

3583. (Meggitt, W. F., and Aldrich, R. J.)
ATA kills redroot in cranberry bogs.
N.J. Agric., 1958, **40** (3): 13.

Amino triazole at 1 lb. per acre applied immediately after harvest gave almost complete control of redroot [*Lachnanthes* sp.?], with no reduction in cranberry yield. The treatment was effective for 2 to 3 years.

3584. Hemphill, D. D.
Weed control in established and new strawberry plantings.
Proc. 14th N. centr. Weed Control Conf., 1957, p. 47.

2,4-DES 6 lb./ac., CDAA 12 lb./ac., ethyl-N,N-di-n-propylthiol-carbamate (EPTC) 10 lb./ac., tris-(2,4-dichlorophenoxyethyl) phosphite (3Y9) 4 lb./ac., simazin 2 lb./ac. and 2-chloro-4-ethylamino-6-diethylamino-s-triazine (G-27901) 4 lb./ac. were applied to Ardmore strawberries before flowering. All caused severe injury and reduced yields except 2,4-DES, but this did not effectively control crabgrass germination. In a new planting of Dixieland strawberries no appreciable injury was caused by 3Y9 4 lb./ac., CDAA 6 lb./ac. and 2,4-DES 4 lb./ac., G-27901 4 lb./ac., and EPTC 6 lb./ac. 2,4-DES tended to suppress runner production slightly more than the other chemicals.—*Weed Abstr.*, **7**, No. 843.

3585. Campbell, R. W.
Crabgrass control in established strawberry plantings.
Proc. 14th N. centr. Weed Control Conf., 1957, p. 48.

Third year Blakemore strawberries were treated with several residual pre-emergence herbicides at the end of July and again at the end of August. Three weeks after the first treatment, simazin 1 lb./ac. and 2 lb./ac., and 2-chloro-4-ethylamino-6-diethylamino-s-triazine (G-27901) 2 lb./ac. had given 100% control of the crabgrass (*Digitaria* spp.), G-27901 4 lb./ac. 99%, neburon 98%, tris-(2,4-dichlorophenoxy-ethyl) phosphite (3Y9) 1·5 gal./ac. 94%, 2,4-D (amide) (Emid) 2 lb./ac. 90%, and 2,4-DES 4 lb./ac. 24%. Simazin 2 lb./ac. caused severe crop injury, simazin 1 lb./ac., G-27901 4 lb./ac. and neburon slight injury. Three weeks after the second treatment simazin 1 lb. and 2 lb./ac., G-27901 4 lb./ac. and neburon had given 100% control of crabgrass, G-27901 1 lb./ac. 99%, 3Y9 and Emid 95%, 2,4-DES 42%. Severe crop injury was shown by simazin 2 lb./ac., 75% of the plants being killed; no other August treatment caused injury. —*Weed Abstr.*, **7**, No. 842.

3586. Doll, C. C.
Chemical weed control studies in young vineyards.
From abstr. in *Proc. 14th N. centr. Weed Control Conf., 1957*, pp. 48-9.

A newly planted Fredonia vineyard and a two-year-old Concord vineyard were treated with diuron 1, 2 and 3 lb./ac., simazin 2 and 4 lb./ac., and CIPC 14 lb./ac.; in the Concord vineyard diuron was also used at 4 lb./ac. Weed control was similar in both vineyards; diuron 1 lb./ac. gave 75% control of *Setaria lutescens* and *Kochia scoparia* for the entire season, diuron 2, 3 and 4 lb./ac., and simazin 2 and 4 lb./ac. gave 90–100% control. CIPC was ineffective after 60 days. After 4 months (following 11 in. rain) mottled chlorosis appeared on the leaves of vines treated with diuron and simazin, being severe with the higher rates. CIPC caused some stunting.—*Weed Abstr.*, **7**, No. 878.

3587. Cosmo, I. (Zanardi, D.).
Il diserbo dei vigneti. **(Weed control in vineyards.)**
Riv. Vitic. Enol., 1958, **11**: 166, summarized from *Colt. Giorn. Vin. It.*, **11**: 957.

Traces of 2,4-D in the soil have produced adverse effects in vines, resembling symptoms of infectious degeneration, but excellent control of grasses, thistles, plantains and other weeds was achieved without injury to the vines by spraying with aminotriazole at 2–16 kg. per ha., avoiding contact with the vines themselves. Recommendations based on trials are: 3 or more applications per year at 2 kg. per ha., or a single application at 4 kg. per ha., either as soon as the weeds have germinated or later after they have been scythed. If scything is impossible, the application rate will need to be 8–10 kg. per ha.

3588. Bruns, V. F., and Clore, W. J.
The response of certain crops to 2,4-dichlororophenoxyacetic acid in irrigation water. Part III.* Concord grapes.
Weeds, N. York, 1958, **6**: 187-93, bibl. 4, illus.

Two-year-old Concord grapes were treated with 2,4-D (triethanolamine) at 0·0625–16 lb./ac. in 3 acre-inches of irrigation water in late June–early July. After 2 weeks 1 lb./ac. or more had caused wilting, chlorosis and/or desiccation of the foliage of some plants, but no leaf deformity. Most of the severely damaged plants died within 2–3 weeks while others similarly treated were unaffected. The root systems of injured plants were often destroyed and the remaining fragments were discoloured with enlarged tips. The conflicting results may have been due to differences in depth, distribution and development of the root systems when treated. The 0·5–16 lb./ac. treatments retarded shoot growth of the surviving plants, with 4, 8 and 16 lb./ac. showing the greatest reduction. By the following year, the 2, 4, 8 and 16 lb./ac. treatments killed 13, 33, 65 and 54% of the plants respectively, and a residual effect from rates of 1 lb./ac. and more on the surviving plants was shown by restricted shoot growth.—*Weed Abstr.*, 7, No. 1081.

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* For part I see *H.A.*, 26: 2711; part II concerns sugar beet.

Weed control in ornamentals.

3589. CHADWICK, L. C., AND JAMES, B. L.
Spring weed control in the nursery with maleic hydrazide.
Proc. 14th N. centr. Weed Control Conf., 1957, p. 27.

MH (diethanolamine) 0·5 and 0·75% was applied in the spring. After 2 weeks there was no weed growth in treated or untreated plots; after 4 and 6 weeks *Bromus tectorum*, *Anagallis arvensis* and *Stellaria media* were killed and *Agropyron repens* and rye were checked. *Taraxacum officinale*, which had not emerged at the time of spraying, was unaffected. No difference was observed between the 0·5 and 0·75% treatments.—*Weed Abstr.*, 7, No. 964.

3590. HOLM, L., TAYLORSON, R., AND PINNEY, T.
Weed control in nursery plantings.
From abstr. in *Proc. 14th N. centr. Weed Control Conf., 1957*, pp. 50-1.

Weed free plots of seedling transplants of Scotch pine, Douglas fir, arbor vitae, blue spruce and alpine currant were sprayed before bud break with simazin 1 and 2 lb./ac., CDAA 4±dalapon 5 lb./ac., CDAA 4±diuron 0·5 lb./ac., dalapon 5 lb./ac., diuron 1 lb./ac., diuron 0·5 or 1 lb./ac.+dalapon 5 or 2,4-DES 4 lb./ac., all applied in 40 gal./ac. Alpine currant was injured only by diuron and pine by simazin and dalapon (slightly).—*Weed Abstr.*, 7. No. 882.

3591. RIES, S. K., AND WATSON, D. P.
Weed control in lining-out stock of four species of ornamentals.
From abstr. in *Proc. 14th N. centr. Weed Control Conf., 1957*, pp. 48-50

Treatments with 9 herbicides applied in 21 gal./ac. water were made to 2-year-old *Cotoneaster acutifolia*, *Syringa rothomagensis*, *Taxus cuspidata capitata*, and *Taxus media hicksi* following transplanting. Best weed control with least crop injury was given by simazin 2 and 4 lb./ac.; good results were also given by 2,4-DES 4 lb./ac.±NPA 4 lb./ac. Good weed control but some crop injury was given by monuron 1 lb./ac., diuron 1 lb./ac., ATA 6 lb./ac., diuron 1 lb./ac.+2,4-DES 4 lb./ac., and dalapon 5 lb./ac.+diuron 1 lb./ac.; poor control but without crop injury by CDEC 4 lb./ac., dalapon 5 lb./ac., NPA 4 lb./ac. and ethyl-N,N-di-n-propylthiolcarbamate (EPTC) 6 lb./ac. The 4 species varied in tolerance to the chemicals; *Taxus cuspidata capitata* showed 60% more injury than *T. media hicksi*.—*Weed Abstr.*, 7, No. 863.

3592. MARCHAL, J.
Sering. **(Lilac.)**
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 80-2.

Plots of newly-planted lilac were kept clear of weeds for 3 months by Aamergens 4% [PCP]+Orga-Simazin 0·15%. In plots with an established weed population, control was best with a tar oil plus DNC. In second-year lilacs contact herbicides (tar oil, DNC or PCP) combined with a growth inhibitor (CIPC, IPC or simazine) gave adequate weed control for at least a month.

3593. MARCHAL, J.
Violen. Onkruidbestrijding. **(Weed control in violas.)**
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 82-3.

Pre-emergence applications of the PCP compounds Shell P.E.30 4% and Aamergens 4% and 6% gave 70–80% weed control in violas. Shell P.E.30 at 6% and another PCP compound Asepta 1000 at 4 and 6% inhibited viola growth.

3594. STADTHERR, R. J., AND WIDMER, R. E.
Chemical weed control in garden chrysanthemums.
Proc. 14th N. centr. Weed Control Conf., 1957, p. 49.

Pre- and post-planting treatments were carried out on replicated and randomized plots of chrysanthemums (*Chrysanthemum morifolium*) infested with *Portulaca oleracea*, *Setaria* spp., *Digitaria* spp. and *Amaranthus retroflexus*. Pre-planting applications of Vapam at 0·5, 1 and 1·5 quarts per 100 sq. ft and Mylone at 0·5, 0·75 and 1 lb. per 100 sq. ft gave good weed control for 4–6 weeks. Of the post-planting treatments monuron 0·8 lb./ac., monuron 0·4+2,4-DES 3·6 lb./ac. and CIPC 2·6 and 3·6 lb./ac. were the most effective, and CIPC 1·9 lb./ac., TCA 5·4 lb./ac. and CDAA 1·9 lb./ac. were also promising. The other less satisfactory treatments are listed.—*Weed Abstr.*, 7, No. 862.

3595. HELMS, C. C., Jr., BURT, E. O., AND CRALL, J. M.
Weed control in plumosus fern under artificial shades.
Circ. Fla Agric. Exp. Stats **S-99**, 1957, pp. 6, bibl. 2, illus.

Weed control in asparagus fern plantations can be obtained by using 2·4 lb./acre active ingredient of diuron once only annually, following hand weeding and mowing [see also *H.A.*, 27: 2363]. Oak shade trees are highly sensitive to this herbicide.

3596. ANON.
Proeven betreffende chemische onkruidbestrijding in de bloembollenteelt. **(Tests with chemical weed control in bulb crops.)**
Meded. Ver. Proefst. Bloembollencultuur, **19**, 1958, pp. 35, bibl. 13, illus.

Monuron and CIPC were applied to hyacinth (var. Fürst Bismark), tulip (var. Rose Copland) and narcissus (var. King Alfred) on several different dates. Monuron cannot be recommended. CIPC has given very good results with no reduction in yield; an application in the autumn followed by another in the spring is recommended; application in 500 l./ha. was better than in 200 l./ha. The following were applied to gladioli: PCP, CIPC, dinoseb, calcium cyanamide, monuron, fenuron, DNC±CIPC, simazin, 2,4-DES, MCPA±CIPC;

CIPC, DNC, MCPA, PCP (in oil) and calcium cyanamide are recommended for pre-emergence use and CIPC for post-emergence.—*Weed Abstr.*, **7**, No. 1074.

3597. Gentner, W. A., Shaw, W. C., and Smith, F. F.
An evaluation of several chemicals for weed control in Easter lilies.
Weeds, N. York, 1958, **6**: 203-10, bibl. 8, illus.

Weeds were satisfactorily controlled in Easter lilies for 2 months or longer by a pre-emergence application of dalapon (sodium) 6–16 lb./ac., CIPC 6, 8 and 16 lb./ac., monuron 2 lb./ac., diuron 1 and 2 lb./ac., 2,3,6-TBA (sodium) 1 and 2 lb./ac. or dinoseb (alkanolamine) 8 and 12 lb./ac. No treatment caused any significant reduction in bulb yields and none injured the plants. Post-emergence application of 2,4-DES 4 lb./ac. caused no injury; neburon 4 lb./ac. caused slight injury as either a broadcast or a directed spray, and CIPC 6 lb./ac. and 2,4-D 0·25 lb./ac. caused little injury as directed and moderate to severe injury as broadcast spray.—*Weed Abstr.*, **7**, No. 1075.

Weed control in tobacco.

3598. Aleksiev, A.
Broomrape on tobacco and its control. [Bulgarian.]
Selskostop. Misyl., 1956, **1**: 93-6, from *Tob. Abstr.*, 1958, **2**, Abstr. 440.

Measures recommended for the control of *Orobanche muteli*, which is a serious parasite of non-rotated tobacco in Bulgaria, are: (1) manuring with 400–500 kg. superphosphate and 250 kg. potassium sulphate per ha., followed by 2 spring top-dressings of 120–250 kg./ha. ammonium nitrate; (2) early transplanting; (3) crop rotation with winter vetches or winter fodder peas; and (4) three spray applications of 0·4% DNC to the basal part of the tobacco stems, but avoiding spraying the leaves.

Weed control in tropical crops.

(*See also* 3621a, d.)

3599. Guyot, H., and Olivier, P.
Herbicides par atomisation. **(Low volume application of herbicides.)**
Fruits d'Outre Mer, 1958, **13**: 203-8, illus.

A comparison was made between ordinary spraying (6 l. PCP+12 l. gas-oil+3 kg. diuron in 400 l. water), low volume applications in water (6 l. PCP+12 l. gas-oil+1 kg. modocolle+3 kg. diuron in 40 l. water) and low volume application in oil (6 l, PCP+3 kg. diuron in 52 l. orchard spray oil) for the control of herbaceous weeds in bananas and pineapple. Low volume oil application was much the most effective and lasting. The methods and levels of applying herbicides as low-volume sprays are discussed. Diuron appears very suitable and efficacious, giving control for as much as 6 months. Simazin shows promise.

3600. Fleming, S., and Lerche, K.
The use of herbicides in sisal.
Kenya Sisal Bd Bull., 1957, No. 22, pp. 35-6, illus.

TCA needed rain after application, but Dowpon at 10 lb./acre and with low volume application, 20–60 gal./acre, controlled couch and was not dependent on continued wet weather. There was little adverse effect on the sisal. Dalapon/amino-triazole mixture shows promise. Certain forms of MCPA and 2,4-D proved phytotoxic to sisal bulbils. It proved possible to control both couch grass and broad-leaved weeds by adding MCPA and 2,4-D to Dowpon.

3601. Rehbein, C. A.
Further steps in the control of reed grass.
Cane Grs' quart. Bull., 1958, **22**: 12-13, illus.

Phragmites communis, abundant in some sugar cane areas, was effectively controlled by dalapon at 15 or, better, 30 lb. in 360 gal. water per acre sprayed on regrowth 9 weeks after cutting.

Weed control in turf.

3602. Campbell, R. W., and Quinlan, L. R.
Crabgrass control in bluegrass.
Proc. 14th N. centr. Weed Control Conf., 1957, pp. 29-30.

In 1956 and 1957 *Digitaria ischaemum* and *D. sanguinalis* growing in bluegrass were treated with various herbicides at 3 stages of growth. In the 1957 trials, when applied pre-emergence, chlordane at 0·5 pt/1,000 sq. ft, 2,4-DES 3 lb./ac.+chlordane 0·5 pt/1,000 sq. ft and lead arsenate 10 lb./1,000 sq. ft gave the best all round kill of crabgrass, and some other materials showed promise. Simazin was the only chemical which severely injured the bluegrass. At the 2–3 leaf stage, disodium methyl-arsonate hexahydrate (DSMA Weed-one) 3 oz./400 sq. ft as a liquid gave complete kill; some other materials also gave very good control and none permanently injured the bluegrass. With mature seedlings DSMA (methar liquid) at 1 pt/3,000 sq. ft gave complete kill.—From *Weed Abstr.*, **7**, No. 958.

3603. Westmoreland, W. G., and Duncan, J. G.
Dalapon and lawn maintenance.
Down to Earth, 1958, **14** (1): 15-16, illus.

On the campus of North Carolina State College Dowpon at 1 lb./5 gal. water controlled Bermuda grass overgrowing the verges of lawns onto paths and around fence posts at considerable saving in cost compared with manual eradication. 2,4-D was added where broad-leaved weeds were also present.

Weed control in vegetables.

(*See also* 3578.)

3604. Bylterud, A.
Resultater av TCA-behandling mot kveke i praksis. **(Results of applying TCA to couch grass in practice.)** [English summary.]
Samvirke, 1958, No. **6**, pp. 7.

Farm trials in Eastern Norway have shown that early spring applications of TCA 20–25 kg./ha. give excellent control of *Agropyron repens* with only negligible damage to swedes, turnips, beet, cabbage and carrots sown 2 weeks later. Severe damage has been caused to peas and cauliflowers.—From *Weed Abstr.*, **7**, No. 1153.

3605. Haronska, G.
Unkrautbekämpfung mit Flammenwerfer.
(Weed control with flame throwers.)
Pflanzenschutzkalender, 1958, p. 1.

Flame throwers are useful for non-selective and selective weed control. About 5–10 l. fuel/hour is used and 2–10 seconds is needed to flame 1 sq. m., depending on the size and density of the weeds. No injury was caused when this treatment was used selectively before the emergence of carrots, leeks, parsley, onions, beans and peas so long as the seed was covered by at least 3 mm. of soil. The immediate and residual effect of flaming was found to be greater than that of chemicals. The time needed for application is longer than that for chemicals, but this is more than compensated for if the cost of herbicides is high, e.g. selective oils, but not if low, e.g. dinoseb.—*Weed Abstr.*, 7, No. 1235.

3606. Ries, S. K., Downes, J. D., and Shugars, J. P.
Pre-emergence weed control in snap beans, cucumbers, carrots and asparagus seedlings.
From abstr. in *Proc. 14th N. centr. Weed Control Conf., 1957*, p. 44.

Snap beans: MCPB 1 lb./ac., ethyl-N,N-di-n-propylthiolcarbamate (EPTC) 6 lb./ac. and CDEC 4 lb./ac. and combinations, pre-emergence, gave good weed control with no crop injury. Mixtures showed no synergistic effects. *Cucumbers:* CDEC 4 lb./ac. was as effective as NPA (acid or sodium) and gave no crop injury. *Carrots:* 2-chloro-4-diethylamino-6-isopropylamino-s-triazine 1 lb./ac., and EPTC 6 lb./ac., pre-emergence, gave good weed control with no crop injury. *Asparagus seedlings:* Simazin 4 lb./ac., monuron 2 lb./ac., diuron 2 lb./ac., 2-chloro-4-diethylamino-6-isopropylamino-s-triazine 4 lb./ac., and 2-chloro-4-bis-(iso-propylamino)-s-triazine 4 lb./ac. gave better weed control than Stoddard solvent or dinoseb.—*Weed Abstr.*, 7, No. 853.

3607. Greig, J. K., and Hall, C. V.
Chemical weed control studies in asparagus plantings.
Proc. 14th N. centr. Weed Control Conf., 1957, pp. 44-5.

Several herbicides were applied pre- or post-harvest, each in 90 gal. of water per acre. Of pre-harvest treatments with sodium 2,4-DES at 3 lb./ac., monuron 1 lb./ac., NPA 4 lb./ac. and simazin 1 and 4 lb./ac. only simazin at 4 lb./ac. damaged the asparagus plants, reducing fern growth. Of post-harvest applications of 2,4,5-TES at 3 lb./ac., monuron 1 lb./ac., NPA sodium salt 12 quarts/ac. and simazin 1 and 4 lb./ac., only simazin at 4 lb./ac. damaged volunteer asparagus seedlings.—*Weed Abstr.*, 7, No. 852.

3608. Couto, F. A. A., and Maestri, M.
Contrôle de ervas daninhas em cenoura (*Daucus carota* L.). **(Weed control in carrots.)** [English summary ½ p.]
Rev. Agric. Piracicaba, 1958, **33**: 87-98, bibl. 10, illus.

Varsol and Shellarez (oils used as paint solvents) killed all weed species present, but had no adverse effects on carrot seedlings with 2 foliage leaves. A 3: 1 mixture of paraffin and petrol gave poor control of the weeds and reduced crop growth. The most effective treatment was overall spraying with Varsol, but it was more economic to spray the crop rows only, using a mechanical cultivator between the rows. [For earlier work see *H.A.*, 27: 2374.]

3609. Becker, A.
Beobachtungen und Erfahrungen bei der Unkrautbekämpfung in Zwiebeln und Möhren mit neuzeitlichen Bekämpfungsmitteln. **(Observations and experiments in weed control in onions and carrots with modern herbicides.)**
Gesunde Pflanze, 1958, **10** (4): 71-3, 75-7, illus.

In carrots pre-emergence CIPC has given better results than post-emergence petroleum oils; a 3: 1 petroleum-diesel oil mixture caused marked injury. CIPC has also given good results pre-emergence in onions. On very light soils where crop injury is more likely, it is recommended that CIPC be applied post-emergence to carrots in the seedling stage and to onions in the loop stage.—*Weed Abstr.*, 7, No. 848.

3610. Bragg, K. K.
A summary of 1957 results with liquid cyanamid.
Proc. 11th Mtg east. Sect. nat. Weed Cttee Canada, 1957, 1958, pp. 45-6.

Liquid cyanamid at 4 gal./ac. in 40 gal. water applied post-emergence to onions gave adequate weed control, although 5–8 gal./ac. gave better results when the weeds were above 2 in. in height and the weather was cool. Rates over 10 gal./ac. burned the tips of onion leaves. In asparagus 5 gal./ac. controlled seedling weeds and 10 gal./ac. weeds up to 4 in. high. Rates up to 20 gal./ac. applied during the cutting season did not damage the spears.—From *Weed Abstr.*, 7, No. 1070.

3611. Kefford, R. O., and Wright, E. W.
Selective chemical weed control in onion crops.
J. Agric. Vict., 1958, **56**: 357-68, illus.

Chloro IPC is recommended as both a pre- and post-emergence spray. Onion seed should be sown 1 to 1½ in. deep and consolidated. Pre-emergence strength of chloro IPC is 2 to 4 lb. per acre, the lighter rate on sandy soils and for cold wet conditions. Post-emergence sprays are from 3 to 6 lb./ac. Where resistant weeds are a problem power kerosene at 40 gal./ac. should replace chloro IPC as the pre-emergence spray. The use of monuron, sodium pentachlorphenate, potassium cyanate and sulphuric acid for weed control in onions is also discussed.

3612. Nylund, R. E., Nelson, D. C., and Dinkel, D. H.
Costs of weeding onions with and without herbicides.
From abstr. in *Proc. 14th N. centr. Weed Control Conf., 1957*, p. 45.

Monuron 1·6 lb./ac., CIPC 8 lb./ac. and monuron 0·8+CIPC 4 lb./ac. each applied three times (once pre-emergence, twice post-emergence) reduced weeding times by 70%, 37% and 54% respectively, and weeding costs by 50%, nil and 26% respectively. In the following year monuron 1·6 lb./ac., CIPC 8 lb./ac. and CDAA 4 lb./ac. applied once (pre-emergence) or twice (pre_ emergence+lay-by) reduced weeding times by 50%; costs were reduced 34–40%. No herbicide treatment significantly affected yields; plots sprayed 3 times and weeded yielded 849 bushels/ac.; sprayed only 3 times 390 bushels/ac., and plots neither sprayed nor weeded produced no marketable crops.—*Weed Abstr.*, **7**, No. 849.

3613. Noll, C. J.
Dinitro band spraying best for weeding limas, snap beans.
Science for the Farmer, 1958, **5** (4): 11, illus.

Pre-emergence applications of water-soluble dinitro compounds gave excellent weed control with little bean damage. Rates of 3–6 lb. per acre are recommended, and band application is the most economical method.

3614. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med ukrudtsbekaempelse på forskellige tidspunkter i aerter. **(Experiments with weed control at various times in peas.)**
Tidsskr. Planteavl, 1958, **62**: 337-8.

Applications of 20% dinoseb (4 l. per ha.) 3 times after emergence resulted in increased yields and lower weed counts. The best results were obtained by application when peas were 2–5 cm. high.

3615. Canvin, D. T., and Friesen, G.
The herbicidal action of IPC and CDAA on wild oats and several crop plants.
Proc. 14th N. centr. Weed Control Conf., 1957, pp. 6–7, bibl. 3.

Propham and CDAA (0·1–1,000 p.p.m.) were applied to seeds of wild oat, Chancellor pea and 2 other crop plants. Studies on root inhibition showed that pea was resistant to CDAA at 10 p.p.m. At high concentrations both compounds caused a slight inhibition of cell division in pea roots proportional to the concentration of the herbicide.—From *Weed Abstr.*, **7**, No. 971.

3616. Wain, R. L.
A development in selective weed control.
Rhod. agric. J., 1958, **55**: 333-5, illus.

A brief review of the methyl chlorophenoxy compounds, including control of annual nettles (*Urtica urens*) by MCPA, MCPB and the caproic acid compound, and control of creeping thistle (*Cirsium arvense*) in pea crops by MCPB.

3617. Nelson, D. C., and Nylund, R. E.
Competition effects of mustard and foxtail millet on processing peas.
Proc. 14th N. centr. Weed Control Conf., 1957, pp. 41-2.

Peas (var. Perfection Freezer) were grown in competition with varying populations of *Brassica hirta* and *Setaria italica*. *B. hirta* was the more effective competitor, emerging 2–5 days before the peas compared with *S. italica* which emerged 10–30 days after the peas. Where weeds were left until harvest the yield of peas was reduced more than where the weeds were removed at the 9–10 node stage. Increasing the population of *B. hirta* gave much greater reductions in crop yield than increasing *S. italica*.—*Weed Abstr.*, **7**, No. 854.

3618. Fang, S. C.
Absorption, translocation and metabolism of 2,4-D-1-C^{14} in pea and tomato plants.
Weeds, N. York, 1958, **6**: 179-86, bibl. 7, illus.

Radioactive 2,4-D was applied to the lowermost leaves of peas (var. Alaska) at the 3–4 leaf stage, and to the midrib of the first primary leaf of tomatoes (var. Bonney Best) at the second true leaf stage. C^{14} activity was measured 1, 3 and 7 days after treatment. As leaf washings from the 1, 3 and 7 day samples were similar it is concluded that absorption by peas only occurred on the first day, when about half of the applied 2,4-D appeared to have been taken up. Tomatoes showed continuous absorption, and by 7 days appeared to have taken up 92% of the applied 2,4-D. Except for the treated leaves radioactivity accumulated mostly in the lower stem and roots. Extraction of plant tissues with 80% ethanol revealed 2 metabolic products, designated unknown 1 (previously found to be the major metabolic product in beans) being the major product in peas, and unknown 3 (found mainly in treated wheat and maize) in tomatoes. Unknown 1 in peas was at a maximum 3 days after treatment and had almost disappeared by 7 days when peas recovered; all pea plants recovered completely. Unknown 3 was found in tomatoes at all stages with a maximum in the 1-day samples; the highest concentration was in the leaf, followed by the stem and root.—*Weed Abstr.*, **7**, No. 1188.

3619. Warren, G. F.
Studies on the control of weeds in transplanted tomatoes.
Proc. 14th N. centr. Weed Control Conf., 1957, p. 46.

2,4,5-TES and simazin, although not directly injuring the foliage, may cause severe injury if leached into the tomato root zone. Neburon showed promise, being resistant to soil movement and giving good weed control; where injury occurred it was probably due to absorption through the foliage, and a granular form is suggested to avoid this.—*Weed Abstr.*, **7**, No. 846.

3620. Wilhelm, S., Benson, L. C., and Sagen, J. E.
Studies on the control of broomrape on tomatoes. Soil fumigation by methyl bromide is a promising control.
Plant Dis. Reptr, 1958, **42**: 645-51, bibl. 18.

Among various methods tested to kill seeds of *Orobanche ramosa* in the soil only fumigation with methyl bromide proved successful [see also *H.A.*, 28: 386]. When applied by a mechanical circulator under polythene tarpaulins to moist, ridged soil at rates above ½ lb. per 100 sq. ft, methyl bromide generally reduced the infestation of broomrape in ¼ acre plots to fewer plants than occurred in 1 sq. ft of non-fumigated soil. Commercial Weedfume, a solution of methyl bromide, gave excellent broomrape control when injected into the soil at rates above 175 lb. actual methyl bromide per acre, the soil being immediately covered with a tarpaulin.—Univ. Calif., Berkeley.

Noted.

3621.

a **BARRONS, K. C.**
Un nuevo herbicida útil en los cañaverales. **(A new herbicide useful in sugar cane plantations.)**
Mem. XXX Conf. anu. Asoc. Téc. azuc. Cuba, 1956, pp. 83-90, bibl. 1. [Received 1958.]
A review on the use of dalapon in the U.S.A.

b **BURRELL, A.**
Weed control practices in canning crops.
Proc. 11th Mtg east. Sect. nat. Weed Cttee Canada, 1957, 1958, pp. 10-13.
A survey of cultural and chemical treatments for weed control in tomato, pea and asparagus used in Ontario.—*Weed Abstr.*, **7**, No. 1069.

c **COMMUN, R.-L.**
Lutte chimique contre les mauvaises herbes dans l'outre-mer. **(Chemical weed control overseas.)**
Agron. trop., 1958, **13**: 361-79, bibl. 25.
A review including tropical plantation crops.

d **CRAFTS, A. S.**
Use of labeled compounds in weed research.
Proc. int. Conf. peaceful Uses atom. En. 1955, 1956, **12**: 157-8, bibl. 12. [Received 1958.]
A progress report. [See also *H.A.*, 28: 2511f.]

e **ELLIOTT, J. G., AND FRYER, J. D.**
Dalapon for the control of grass weeds.
Agriculture, Lond., 1958, **65**: 119-24, bibl. 1.
Preliminary notes on its uses and the susceptibility of various species.

f **NATIONAL WEED COMMITTEE, EASTERN SECTION.**
1958 weed control recommendations for Eastern Canada.
[*Publ.*] *Canada Dep. Agric.* [1957], pp. 25, and *Proc. 11th Mtg east. Sect. nat. Weed Cttee Canada 1957*, 1958, pp. 78-105.
Second reference cited in *Weed Abstr.*, **7**, No. 1226.

g **QUEBEC. INFORMATION AND RESEARCH SERVICE.**
Manuel d'emploi des herbicides. **(Handbook on the use of herbicides.)**
[*Publ.*] *Minist. Agric. Québec* **I.R.2,** 1958, pp. 36.
Notes on herbicides and application, with recommendations for use in various crops.

h **REPP, G.**
Die Unkrautvegetation auf Bahnkörpern im Hinblick auf die Bekämpfung mit herbiziden Wuchsstoffen. **(The weeds of railroads, with special reference to their control by herbicidal growth substances.**
Angew. Bot., 1958, **32**: 91-104, bibl. 8.
With a list of weeds, giving their occurrence and their response to 2,4-D.

i **SHAFER, N. E., AND MONSON, W. G.**
The rôle of gibberellic acid in overcoming bud dormancy in perennial weeds. 1. Leafy spurge (*Euphorbia esula*) and ironweed (*Vernonia baldwini.*)
Weeds, N. York, 1958, **6**: 172-8, bibl. 6, illus.
See *Weed Abstr.*, **7**, No. 1192.

j **SHEETS, T. J., AND LEONARD, O. A.**
An evaluation of the herbicidal efficiency of combinations of ATA with dalapon, monuron and several other chemicals.
Weeds, N. York, 1958, **6**: 143-51, bibl. 12.
Kidney beans were among the test plants.
—See *Weed Abstr.*, **7**, No. 1190.

k **SPURRIER, E. C., SCOTT, W. O., AND SLIFE, F. W.**
Chemical control of weeds and brush.
Circ. Univ. Ill. Ext. Serv. **771,** 1957, pp. 19.
General recommendations.

l **STEPHENS, J. C., CRAIG, A. L., AND HARRIS, D. S.**
Controlling submersed water weeds with emulsifiable solvents in South Florida.
Circ. Fla agric. Exp. Stats **S-97,** 1957, pp. 14, illus.
Suitable solvents, practical instructions and precautions.

m **YEATES, J. S.**
Weed control in horticulture.
N.Z. Plants and Gdns, 1957, **2**: 141-4, 191-5.
A review, dealing with cultivation, mulching and chemical herbicides.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 3227, 3232, 3257, 3271, 3273-3277, 3285h, v, 3457, 3529, 3564, 3565, 3567, 3568, 3570, 3571, 3604-3620, 3621b, j, 3795k, r, w, x, 3796h, m, o, 4169, 4174, 4175, 4184, 4185, 4190, 4191, 4193, 4195, 4200m.)

3622. WELLESBOURNE.
Eighth Annual Report of the National Vegetable Research Station, Wellesbourne, 1957, 1958, pp. 67.

Two papers are abstracted separately. Research in progress includes the following: *Plant breeding:* lettuce, red beet, brussels sprouts, onion, radish and peas. *Chemistry:* fertilizer trials with spring cabbage and runner beans; organic constituents of red beet; biochemical factors affecting pea seed germination. *Plant physiology:* carrot growth in relation to manuring; weed competition; growing onions for pickling; propagation of watercress from seed. *Irrigation:* irrigation of a rotation of crops; cauliflower irrigation and growth studies; irrigation of self-blanching celery; studies of water loss from plant/soil systems. *Entomo-*

logy: cabbage root fly; carrot fly; lettuce root aphid; pea moth; effect of insecticides on flavour. *Plant pathology:* watercress crook root and mosaic; red beet silvering disease; stem and fruit rot of outdoor tomatoes; parsnip canker; clubroot of brassicas; leaf and pod spot of peas; lettuce mosaic, big vein disease and botrytis disease. *Weed investigations:* ecology and chemical control.

3623. National Institute of Agricultural Botany.
Guide to varieties of field and vegetable crops under trial, observation and propagation, 1958, N.I.A.B., Cambridge, pp. 71.

Horticultural crops submitted to trials of various natures include topine, Russian comfrey, cauliflower, turnip, brussels sprout, pea, onion, carrot, cabbage, runner bean and red beet. In most cases explanatory notes or tables are brief.

3624. Nakamura, S.
Storage of vegetable seeds. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1958, **27**: 32-44, bibl. 9.

Seeds of turnip, Chinese cabbage, mustard, cucumber, watermelon, squash, tomato and radish had a relatively long life. Seeds of carrot, edible burdock, Welsh onion, onion, spinach, cabbage, lettuce, pea and bean had a shorter life. Over long storage periods quicklime was less satisfactory than calcium chloride as a desiccant as it reduced the moisture content too much, particularly that of pea and bean seed. Cold storage was less effective than storage at room temperature in a dry atmosphere. Heat resistance of seeds was generally in proportion to their longevity.

3625. Zehgruber, H.
Keimungsphysiologische Untersuchungen zur Frage der Mischkultur im Gemüsebau. **(Physiological studies on germination in relation to mixed cropping of vegetables.)**
Gartenbauwiss., 1958, **23**: 113-29, bibl. 34, illus.

The effect of germinating carrot, spinach and beetroot seeds on the germination of several other vegetable seeds, in particular lettuce, was studied in petri dishes. The rate of germination was greatly reduced in all the test vegetables, except bean; beetroot also reduced percentage germination. The inhibition was shown to be a growth-substance effect. Soil type modified the inhibitory germination effect. Carrot seed promoted root growth in lettuce seedlings, but root form was altered. Lettuce root growth was markedly inhibited by spinach seed germination, and roots were injured. Beetroot seed germination stopped normal lettuce germination and most of the seedlings died.—Inst. Acker- u. PflBau, tech. Hochsch., München.

3626. Buntrock, H.
Untersuchungen über den Einfluss der Zusatzbestrahlung auf die Keimung von Gemüsesaatgut. **(Studies on the effect of supplementary light on the germination of vegetable seeds.)**
Saatgut-Wirtsch., 1958, **10**: 137-8, bibl. 6.

Supplementary lighting increased tomato germination, reduced lettuce germination but had little effect on that of radish, carrot and celeriac. The effect of light was indirect, by raising soil temperatures. Germination of tomato and cucumber was low at an average soil temperature of 10·6° C., but increased with the rise in temperature resulting from extra illumination.

3627. Fröhlich, H.
Untersuchungen über Fragen der Fruchtfolge im Feldgemüsebau. **(Studies on questions of rotation in the growing of vegetables in the field.)** [Russian and English summaries 13 lines each.]
Arch. Gartenb., 1957, **5**: 284-412, bibl. 158, illus. [received 1958].

The experiments described are the first phase of a study carried out at Grossbeeren in light, loamy sand containing humus; they cover the period 1952–55. The value of individual vegetable crops for succeeding vegetable crops was determined, together with their soil moisture requirements. The following descending order of merit for the succeeding crop was established for vegetables cleared in the autumn: leeks, clover-grass mixture, celeriac, staked tomato, bush tomato, carrot, cucumber, Chinese cabbage, white cabbage. As spring-cleared rotations, fallow and lettuce were considered favourable to the succeeding crop, whereas cauliflower, kohlrabi, onion and peas were unfavourable. In an attempt to find the cause of the different effects of preceding crops the following factors were examined: formation of matter above-ground and above-ground residues, root formation and root residues, soil covering, soil shade, temperature in the air layer near the soil and temperature of the tilth, humidity of the soil surface, soil structure, soil moisture and availability of nutrients. Clear, positive relationships existed between soil shade and weeds, root residues and soil structure, soil structure and soil moisture, soil moisture and growth of the succeeding crop. Certain relationships were found to occur between the time of soil cultivation and the yield of the succeeding crop. The growing of cabbage after cabbage caused some growth inhibition in the absence of any specific disease [see also *H.A.*, 28: 414]. Leeks and clover-grass mixture had a beneficial effect which extended to the second succeeding crop.—Inst. Gartenb. Grossbeeren.

3628. Gusejnov, D. M.
A stimulant of petroleum origin as a means of increasing productivity. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **119**: 1032-4, bibl. 16.

Earlier work in Azerbajdžan has shown that a growth stimulant of petroleum origin (sodium naphthenate) increased the productivity of crop plants. In trials in 1955 and 1956 the material was applied to cabbage and tomato plants in pots at 12·5 mg. per 30 kg. soil with or without NPK, and in the field at 56 and 280 g. per ha. with or without NP. The treatments improved yields by various amounts up to 78% in tomato and 64% in cabbage.

3629. Toniolo, L., and de Poli, E.
Contributo allo studio del comportamento di diverse specie agrarie in ambiente salino. **(Contribution to the study of the behaviour of various crops in saline media.)**
Agric. Venezie, 1958, **12**: 260-83, bibl. 86, illus.

Results of pot experiments with beans, peas and beet are given in detail, showing the effects of sodium chloride concentrations ranging from 0 to 0·3% of the dry weight of the soil on germination, seedling height, dry and fresh weight and Cl content of shoots and roots. In bean seedlings there were adverse effects when the concentration was above 0·05% and in peas even this concentration reduced the production of dry matter. Uptake of salt was higher, but less harmful, in beans than in peas. Beet seedlings responded favourably to salt concentrations up to and including 0·2% by increased production of dry matter. Shoot growth was retarded at and above 0·15% and germination was markedly reduced at 0·3%, and retarded at and above 0·15%. In mature bean and pea plants each increment in soil salt concentration reduced dry weight, but plant height was increased by 0·05 and 0·1%. Flowering was delayed at and above 0·2%. Pods did not develop on bean plants at 0·3% and did not mature at 0·2%. Pea pods did not develop at either of these salt concentrations and in both crops their maturing was delayed at and above 0·15%. For beans, the best of a number of corrective treatments with S or gypsum for a soil sodium chloride content of 0·3% was the addition of S at half the rate of the chloride. Gypsum at 1½ times the chloride content was almost as effective. Comprehensive data are set out from water-culture experiments with beans, supplied with 0, 0·3 and 1·1% of sodium chloride in the nutrient solution, with water alone or with salt solutions alone. Shoot growth was retarded and root growth stimulated by the 0·3% salt, but 1·1% salt inhibited all growth. Transpiration was markedly reduced by the 0·3% salt.

3630. Clay, D. W. T., and Davison, J. G.
Effects of soil salinity on glasshouse crops.
A.R. Nott. Univ. Sch. Agric. 1957, 1958, pp. 39-42, bibl. 5.

Glasshouse plots with a low level of soil salinity were treated with a 3:1 mixture of potassium sulphate and hydrated magnesium sulphate at rates equivalent to 9, 18 or 27 tons per acre; a control plot was left untreated. Two tomato varieties were planted on each of the 4 plots, and moisture tension was maintained near the optimum for growth. Differences between treatments were apparent in vegetative growth and yield during the early part of the season but became progressively less marked as the salts were leached by irrigation into the lower soil horizons. During the first 2 months of cropping the weight of fruit picked from Ailsa Craig ranged from 6·1 lb. per plant in the non-saline to 3·8 lb. in the most saline plots; during the last 7 weeks of the season there were no significant differences in weight of fruit picked. Fruit from the saline plots was smaller and matured more quickly, but in the early part of the season showed symptoms of blossom-end rot, which was absent from the non-saline plots. Blotchy ripening occurred only on the non-saline plots. The results showed that a pC value of 2·9 is the lowest salt concentration at which yield is likely to be reduced, if the soil is kept moist. The addition of gypsum at 10 tons per acre to the above treatments did not significantly affect yields. *Lettuce*. Increased salinity produced smaller, more intensely coloured plants which wilted at high temperatures. Mean fresh weights of control plants were more than double those of plants subjected to the highest salinity treatment. Plants grown on saline plots were slower to heart and more prone to botrytis and tip-burn than those on non-saline plots.

3631. Shickluna, J. C., Davis, J. F., and Lawton, K.
Correlation of soil tests, plant-tissue tests, and yield response of several crops grown on organic soils.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 884-95, bibl. 5.

From the data reported the following soil test levels and supplemental plant food requirements are tentatively suggested: (1) Carrots and table beets—a soil test of 10 lb. of P and 100 to 125 lb. of K per acre supplemented with 400 lb. of 0–10–30 per acre annually. (2) Onions—a soil test of 15 lb. of P and 200 lb. of K per acre supplemented with 800 lb. of 5–10–20 per acre annually, provided the fertilizer is applied in a band 2 in. below the seed. (3) Celery—with soil test levels of 30 to 35 lb. of P and 600 to 700 lb. of K per acre, no practical increase in yield of celery would be expected from additional amounts of P and K. Placement of fertilizers is an important factor to consider in interpreting soil tests with crops such as onions. An increase of 30 to 40% in onion yields can be expected if the fertilizer is applied in a band 2 in. below the seed rather than in bands 7 in. apart and 3½ in. deep with a grain drill. [From authors' summary.]

3632. Nagels, W., and Roorda van Eysinga, J. P. N. L.
Vijf jaren bemestingsproef in een warenhuis met sla, tomaten en bonen. (**Five years' manurial trials in a Dutch light structure with lettuce, tomatoes and beans.**) [English summary 1 p.]
Meded. Dir. Tuinb., 1958, **21**: 350-66, bibl. 7, illus.

Three vegetable crops were grown in a heated structure in a humus-rich, sandy loam soil. Nitrogen had little effect on lettuce and beans, but highest lettuce yields were obtained with 0·4–0·6 kg. N as nitrochalk per are; bean yields tended to drop as N was increased. Lack of N resulted in much lower tomato yields; the optimal dressing was 2·4–3·6 kg. N as nitrochalk per are. Di-calcium phosphate applications gave satisfactory results; a satisfactory P_2O_5 level is required for quantity and quality of tomato yields. Lettuce and beans did not respond to K_2O applications, except at low soil K_2O levels (0·008 to 0·01%). A soil K-content of 0·015 to 0·02% was sufficient for tomatoes, but quality was better at higher levels. Lettuce and beans did respond to Mg fertilization if the soil Mg-content was 0·011% (MgO-NaCl); at this level tomatoes showed Mg deficiency, which was corrected by Mg applications without increasing yield. Farmyard manure hardly affected lettuce and bean growth, but the risk of corky root with tomatoes was reduced.—Rijkstuinbouwconsulentschap, Maastricht, and Proeft. Noord-Limburg, Venlo.

3633. CHABANNES, J.
Enquête sur les conséquences éventuelles d'applications répétées de borate aux terres cultivées. **(An investigation on the eventual effect of repeated applications of borate to cultivated land.)**
C.R. Acad. Agric. Fr., 1958, **44**: 440-5, bibl. 1.

Analysis of beetroot leaves grown on land which had received 5–7 applications of 20–25 kg./ha. of borax over a period of 15–20 years did not show significantly increased B content compared with control plants. Nevertheless toxic effects of B excess were observed with several crops, including tomatoes, in pot experiments using different soil types, after 11 applications of borax at 20 or 50 kg./ha. It is concluded that when a total of 200–250 kg./ha. of borax has been applied crops should be tested to see whether excess levels have been reached.

3634. MYSZKA, A.
Wpływ nawożenia borem i manganem na zawartość witaminu C w niektórych warzywach w warunkach polowych. **(The effect of boron and manganese on the vitamin C content of certain vegetables tested under field conditions.)** [English and Russian summaries 2 pp. each.]
Ann. Univ. M. Curie-Skłodowska, Sect. E, 1956 (issued 1958), **11**: 97-121, bibl. 39.

At the Felin Experimental Station of the Lublin Agricultural College various rates of B as borax and Mn as manganese sulphate were applied to cabbage, French beans and lettuce. All treatments increased the ascorbic acid content of the crops, the magnitude of the increments being statistically evaluated. Under conditions favourable for ascorbic acid synthesis the effect of the micro-elements was greater. Thus in beans when the ascorbic acid content of the controls was 28 mg.% B treatment gave a 14% increase, while with controls showing 32 mg.% B treatment resulted in a 28% increase.

3635. RICKS, C. B.
The yield and manganese content of several crops grown on soil treated with different forms of manganese carriers.
Diss. Abstr., 1958, **18**: 9-10, being *Publ.* 21,383 of 127 pp.

The addition of Mn, regardless of type of carrier, significantly increased dry-weight yields and Mn content of all crops studied compared with the controls. In general, as the rate of application of each Mn carrier increased, the dry-weight yield and Mn content of each crop was increased; but frit application at 2 tons per acre did not increase dry matter over the 1 ton rate. Both soil and foliage applications of Mn significantly increased onion yields over control plots, but soil applications were more effective. Yields of spinach were significantly increased by all rates of manganese sulphate and by highest rates of frit FN-239B. Soil applications of all carriers increased Mn content of spinach as compared with the control.—Mich. St. Univ.

3636. JOHNSON, S. P.
Uses of gibberellic acid.
J. Rio Grande Valley hort. Soc., 1958, **12**: 95.

Preliminary field trials with GA in Texas suggest interesting possibilities. Among results, briefly noted in this article, were lengthened table grape inflorescences, increased size of celery at harvest, increased height of spinach plants to eliminate soil damage to the lower leaves and elimination of necessity for chilling in carrots grown for seed. Tomatoes responded by setting fruit earlier when sprayed with GA at rates up to 25 p.p.m., an effect which was enhanced by adding 8 p.p.m. of parachlorophenoxyacetic acid to the spray. Seed treatments gave variable results but in some cases emergence was stimulated.—Tex. agric. Exp. Stat., College Station.

3637. HARRIS, M. R.
Plant pathology.
Wash. St. Res. Progr., 1958, No. 10, pp. 4.

Hexachlorobenzene applied to the furrow at sowing or as a seed treatment successfully controlled onion smut disease. Application of terrachlor and Parzate solutions at transplanting reduced club root of brassicas; incorporation of terrachlor into the soil before transplanting also reduced club root. Premerge applied when mint was several inches high gave better control of rust than when applied before emergence; annual weeds were also controlled by Premerge spray. Phybam (70% S, 9½% ferbam+3% Phygon) gave promising control of apple mildew, and a new karathane material (used without a wetter) also gave good control. July pruning followed by a streptomycin spray has given good results against fireblight on pears. Maneb was the most effective fungicide used against cranberry diseases. PMAS was the most successful material against *Fusarium* patch of turf, and treatment at 14-day intervals is recommended.

3638. RUI, D., AND GIRALDI, G.
Nematodi fitoparassiti e nematocidi. **(Plant-parasitic nematodes and nematocides.)** [English summary ½ p.]
Ann. Sper. agrar., 1958, **12**: 481-502, bibl. 9, illus.

Market-garden soils in the Chioggia area near Venice were fumigated while fallow and then planted with celery, eggplants, tomatoes and melons. In the year of application, Cymag (a sodium cyanide product) dusted and lightly incorporated at 10 g. per sq. m., gave the best control of *Heterodera marioni*, with D-D a close second. Residual effects in the following year were markedly best with D-D but Cymag showed little activity. Celery and cauliflower plants were stimulated in growth by pre-treatment of the soil with either D-D or ethylene dibromide, but sowing or planting could not be safely carried out within 15 days of fumigation.

3639. PARR, W. J.
Red spider mite *(Tetranychus telarius* L.).
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 132-4, bibl. 3.

In glasshouses the rate at which both the eggs and young mites developed was accelerated by approximately 22% for each 5° F. rise in temperature within the range 70°–85° F.

3640. Kassab, A., El Dine, S. B., and Shahwan, A. A. M.
The effect of some synthetic compounds on the mole-cricket in comparison with zinc phosphide.
Agric. Res. Rev., 1958, **36**: 59-72, bibl. 15.

Laboratory and field trials were carried out with DDT, BHC, chlordane, toxaphene and E605 against mole crickets (*Gryllotalpa gryllotalpa*), a serious pest of vegetable crops in Lower Egypt. With the exception of DDT, which was ineffective, all the insecticides gave excellent control when used either in bait or as dusts. There was little difference between the compounds and all were as good as or better than the traditional zinc phosphide bait. They had no unfavourable effect on growth, flavour or quality of the many vegetable crops tested.—Minist. Agric., Egypt.

3641. Whellan, J. A.
Report of the chief entomologist for the year ending 30th September, 1956.
Rhod. agric. J., 1958, **55**: 302-13, bibl. 8.

Leaf-eating ladybirds (*Epilachna dregei*) on tomatoes were completely controlled by a single spray of 0·06% endrin, but resisted frequent applications of DDT. *E. chrysomelina* on cucumbers was controlled by a spray containing dieldrin, without damage to the leaves.

3642. David, W. A. L., Gardiner, B. O. C., Chapman, C., and Phillips, M. A.
Fluoroacetamide as a systemic insecticide.
Nature, 1958, **181**: 1810-11, bibl. 8.

When poured on the soil, for systemic action against *Aphis fabae* on broad bean, fluoroacetamide was as immediately effective and as persistent as the more dangerous sodium fluoroacetate [see *H.A.*, 21: 2625] and superior to schradan. When applied in the same way against *Brevicoryne brassicae* and *Myzus persicae* on cabbage it was superior to sodium fluoroacetate. When applied by the cut tap-root technique or to petioles against *A. fabae*, *B. brassicae* or *Pieris brassicae* it was as effective as sodium fluoroacetate and superior to schradan. In an appended note the last 2 authors report that 100% kill of *Macrosiphum rosae* was obtained on rose cuttings by dipping the cut ends in fluoroacetamide at concentrations of 1 in 1,000 to 1 in 100,000; only the strongest concentration caused any damage to cuttings. When applied to rose bushes as a spray or to the roots only the insecticidal effect persisted for 2–3 weeks [see also *H.A.*, 26: 1640m].

3643. Wene, G. P.
Toxaphene residues on certain vegetables at various time intervals after application.
J. Rio Grande Valley hort. Soc., 1958, **12**: 106-10.

Residues of toxaphene, applied as sprays or dusts, were negligible within a few hours of application on canning beans and bell peppers. On cabbage and lettuce they declined to low levels within a week. On onions they remained high on the tops for 3 weeks, but almost disappeared from the bulbs within 2 weeks. On beetroot they were still high 19 days after application on both tops and roots.—Tex. agric. Exp. Stat., Weslaco.

3644. Weinmann, W., and Schuphan, W.
Saatgutinkrustierung mit Insektiziden, eine der bedenklichsten Pflanzenschutzmassnahmen. **(Seed pelleting with insecticides, one of the most questionable plant protection measures.)**
Reprinted from *Naturwissenschaften*, 1958, **45**: 194-5, bibl. 2.

Seed pelleting with the chlorinated hydrocarbons aldrin, dieldrin and heptachlor led to toxic residues in the edible portions of radishes and carrots at harvest time. The residue in black radishes reached the permissible toxic limit, but onions showed no residue.—Bundesanst. Qualitätsforsch., Geisenheim/Rheingau.

Asparagus.

(*See also* 3796r.)

3645. Linn, M. B., and Lubani, K. R.
Zineb as a protective fungicide for the control of asparagus rust.
Plant Dis. Reptr, 1958, **42**: 669-72, bibl. 10.

Zineb (65%) as a spray gave better control of asparagus rust in Northern Illinois than did maneb, ferbam or captan. A schedule of 8 applications at about 8-day intervals beginning on June 18 was superior to 4 or 6 applications. Zineb is recommended at 2 to 3 lb. in 100 gal. of water per acre, beginning shortly after the end of harvest and continuing at 8- to 10-day intervals until about August 15. [Authors' summary.]—Univ. Ill., Urbana.

Artichoke (Jerusalem).

See 3795y.

Brassicas.

(*See also* 3795p, 3796f, n, s.)

3646. Schuphan, W.
Biochemische Stoffbildung bei *Brassica oleracea* L. in Abhängigkeit von morphologischen und anatomischen Differenzierungen ihrer Organe. Ein Beitrag zur Züchtung von Nahrungsträgern hohen biologischen Wertes. 1. Teil: Vegetative Organe. **(Biochemical build up in different parts of *B. oleracea* in relation to variations in morphology and anatomy. On breeding food plants of high biological value. Part 1. Vegetative organs.)** [English summary 3 pp.]
Reprinted from *Z. Pflanzenz.*, 1958, **39**: 127-86, bibl. 55, illus.
Beziehungen zwischen morphologischen Variationen und biochemischen Veränderungen bei *Brassica oleracea* L. **(Relationships between morphological variations and biochemical changes in *Brassica oleracea*.)**
Reprinted from *Naturwissenschaften*, 1958, **45**: 170, bibl. 1.

Morphological variations in vegetative organs of *Brassica oleracea* occur only in the main shoot axis, leaf blade, mid-rib and axillary buds. Biochemical changes are related to these variations and these become more marked if morphological changes influence the basic physiological processes in the plant. Some effects of morphological changes on the nutritional values of brassicas are described. Some pointers are given for improving the nutritional value of brassicas by breeding and selection.—Bundesanst. Qual. pfl. Erzeug., Geisenheim.

3647. Chinoy, J. J., Nanda, K. K., and Garg, O. P.

Effect of ascorbic acid on growth and flowering of *Trigonella foenum-graecum* and *Brassica chinensis*.

Physiol. Plant., 1957, **10**: 869-76, bibl. 8.

Application of ascorbic acid solution, of 250 or 400 mg. per litre, to the growing points of *Trigonella foenum-graecum* and *Brassica chinensis* seedlings resulted in taller stems, more and larger leaves, earlier flowering, significantly greater numbers of flowers and fruits per plant and seeds per fruit, and heavier seeds. The interaction between ascorbic acid and endogenous indoleacetic acid is discussed. It is concluded that ascorbic acid has an inductive effect analogous to that of vernalization.—Univ. Delhi.

3648. Garg, O. P., Chinoy, J. J., and Nanda, K. K.

Interaction of ascorbic acid and colchicine on growth and development of *Brassica chinensis* L. [Spanish summary ½ p.]

Phyton, 1958, **10**: 17-25, bibl. 15, illus.

The growing points of 9-day-old Chinese cabbage seedlings were treated with either ascorbic acid at 0·4 g./l., colchicine at 1 g./l., ascorbic acid at 0·8 g./l. plus colchicine at 2 g./l., or with distilled water. Colchicine retarded growth, delayed flowering and reduced the number of flowers and fruits, the number of seeds per fruit and the weight of 1,000 seeds. Ascorbic acid alone stimulated growth and reproduction and largely overcame the depressing effects of colchicine when the two were applied in combination. It is suggested that the depressing effects of colchicine may be due to an increase in the structural viscosity of the protoplasm and to a decrease in the amount of endogenous ascorbic acid.—Dep. Bot., Univ. Delhi.

3649. Narvestad, K.

Arbeidsprosesser og kostnader ved bruk av fiberpotter og leirpotter ved tiltrekking av tidligkål. (**Labour requirements and costs in the use of fibre and clay pots for the raising of early cabbage.**)

Gartneryrket, 1958, **48**: 482-4.

Although clay pots were considerably cheaper, fibre pots were, on the whole, much more economical in the raising of early cabbage plants owing to saving of labour at planting out and bench space later.—Inst. Manag. agric. Econ., Vollebekk.

3650. Nieuwhof, M.

Vegetative maintenance and propagation of cauliflower. [Dutch summary 7 lines.]

Euphytica, 1958, **7**: 170-8, bibl. 14, illus.

The most successful method of vegetative propagation of cauliflower was by rooting adventitious shoots produced from the main root system. The percentage of plants forming such shoots is generally over 50%, and shoot production is encouraged by removal of the curd. Propagation in the spring is preferred, but winter propagation may also be successful if additional lighting is used. The percentage regeneration from root cuttings was usually low (about 20%), and results were also disappointing with overwintered mature plants, and propagation from leaf cuttings, full-grown flower stalks and curd portions.—Inst. hort. Plant Breeding, Wageningen.

3651. Burleson, C. A., Cowley, W. R., and Otey, G.

The yield, head weight and head size of cabbage as affected by different fertilizer treatments.

J. Rio Grande Valley hort. Soc., 1958, **12**: 114-18, bibl. 6.

The yield of cabbage was increased from 7·4 tons per acre without N to 10·5, 15·0 and 16·8 tons per acre respectively with 60, 120 and 180 lb. N per acre. N and P_2O_5 alone and in combination resulted in an increase in the yield of medium size cabbage and a reduction in the yield of small sizes. Average head weights were slightly increased from both N and P_2O_5 treatments, whereas K_2O applications caused a slight decrease in average head weight. The highest total yield (19·1 tons per acre) was from a combination of 180 lb. N and 120 lb. P_2O_5. [Authors' summary.]—Tex. agric. Exp. Stat., Weslaco, and Rio Fms, Inc., Edcouch.

3652. Reeker, R.

Die Bedeutung des Molybdäns bei der Torfkultur. (**The importance of molybdenum in peat culture.**)

Torfnachrichten, 1957, **8**: 18-19, illus.

Small amounts of sodium molybdate—the optimum quantity is still to be ascertained—prevented the appearance of molybdenum deficiency in lettuce and cauliflower grown in peat.

3653. Wright, D. W.

A combined treatment for the control of cabbage root fly and whiptail in summer cauliflowers.

A.R. nat. Veg. Res. Stat., Wellesbourne, for 1957, 1958, pp. 46-7, bibl. 4.

Dieldrin plus sodium molybdate, both 0·03%, at ⅛ pint per plant applied to the soil after transplanting, controlled both *Erioischia brassicae* and whiptail. Mo applied to seed trays was less effective.

3654. McLean, D. M.

Role of dead flower parts in infection of certain crucifers by *Sclerotinia sclerotiorum* (Lib.) D. By.

Plant Dis. Reptr, 1958, **42**: 663-6, bibl. 11, illus.

The importance is emphasized of non-living organic matter at the loci of infection by *Sclerotinia sclerotiorum*. The extent of infection in crucifers grown from seed in northwestern Washington is related to the frequency of rainfall during the flowering period, which causes fallen blossom parts to adhere to the foliage. Broccoli and cauliflower grown for processing, which do not flower, are not infected. Artificial foliar infections by mycelium or sclerotia occurred only through abrasions or when dried flower parts were present on the leaves. Cabbage flowers may become infected before they fall, but the importance of such infection in the field is not known.—U.S. Dep. Agric., agric. Res. Serv., Mount Vernon, Wash.

3655. Rubin, B. A., and Ivanova, T. M.
The oxidative transformation of amino acids in the reaction of cabbage tissue to the fungus *Botrytis cinerea.* [Russian, with English summary 10 lines.]
Biohimija, 1958, **23**: 540-6, bibl. 32.

It was found that the tissues of cabbage varieties resistant to *B. cinerea* contained 4–5 times greater amounts of readily oxidisable amino acids than those of non-resistant varieties, and also had a much greater amino acid oxidising activity. Infection markedly increased amino acid oxidation in the resistant varieties but not in the non-resistant. Peroxidase activity was also higher in the resistant varieties. It is suggested that the system flavin oxidases-peroxidase plays an important part in the defence mechanism of cabbage against *B. cinerea.*

3656. Wene, G. P.
Cabbage looper control experiments during 1956.
J. Rio Grande Valley hort. Soc., 1958, **12**: 111-13.

Toxaphene, either as a dust or spray, failed to give commercial control, but the addition of either parathion or methyl parathion increased the control obtained. Commercial control was also obtained with trithion, parathion, methyl parathion, endrin, phosdrin, malathion, Sevin, and a mixture of Perthane and malathion. [Author's summary.]—Tex. agric. Exp. Stat., Weslaco.

3657. Brett, C. H., Campbell, W. V., and Habeck, D. E.
Control of three species of cabbage caterpillars with some new insecticide dusts.
J. econ. Ent., 1958, **51**: 254-5, bibl. 7.

In 2 tests 5 insecticide dusts were applied against the caterpillars of *Trichoplusia ni*, *Pieris rapae* and *Evergestis rimosalis.* At the concentrations used the most consistently effective compound was 20% toxaphene.—N.C. St. Coll., Raleigh.

3658. Wilson, J. W., and Van Middelem, C. H.
Residues resulting from applications of demeton to cabbage and celery.
J. econ. Ent., 1958, **51**: 175-8, bibl. 6.

Soil drenches of demeton, applied in amounts up to 1·25 lb. active material per acre when cabbages were transplanted, generally, but not invariably, resulted in residues of less than 0·75 p.p.m. when the crop was harvested 52 to 79 days later. Under some conditions dosages exceeding 0·5 lb. active demeton per acre produced residues higher than this tolerance level. Celery treated in a similar manner with 1·25 lb. active demeton carried a residue of 0·72 p.p.m. 100 days later; lower dosages produced proportionately lower residues. When both cabbages and celery were sprayed with 0·25 lb. active demeton at 21-day intervals residues 21 days after the last application were less than 0·75 p.p.m. except in one cabbage sample which contained 0·8 p.p.m.—Fla agric. Exp. Stats, Sanford and Gainesville.

Celery.

(*See also* 3658, 3667.)

3659. Potter, H. S., Cloninger, C. K., and Drost, A.
Foliar and soil applications of chemicals for the control of pink rot of celery.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 734-9, bibl. 1, illus.

Dust and spray applications of Terraclor appeared to give the best control of pink rot (*Sclerotinia sclerotiorum*). Soil treatments of Terraclor alone and in combination with Vapam and captan were also effective, as was Vapam at the higher concentration tested. [From authors' summary.]

3660. Härtel, K.
Organic tin compound as a crop fungicide.
Tin and its Uses, Summer 1958, No. 43, pp. 9-14, bibl. 5, illus.

In field trials the organic tin compound Brestan (based on triphenyltin acetate) showed low phytoxicity and high activity against *Septoria apii* of celeriac and certain other crop diseases.

Cucurbits.

(*See also* 3270, 3641, 3795b, s, 3796g, j, l, t, 3898.)

3661. Davydov, A. P., and Sventitskii, I. I.
A method of installing fluorescent lighting in glasshouses. [Russian.]
Mekhan. i Elektrif., 1957, No. 2, p. 40, bibl. 6, illus., from *Agric. hort. Engng Abstr.*, 1958, **9**, No. 687.

Experiments were carried out to compare the effect on cucumbers of incandescent lighting, fluorescent tubes with an inductor, and combined lighting in frames, each 1·5 m. long and 0·93 m. wide with 10 fluorescent tubes and 10 incandescent bulbs (40 W., 127 V.). The use of the last 2 installations resulted in better growth than the first-mentioned, and caused fruit formation to begin about 20 days earlier than on control plants without supplementary lighting. Under fluorescent lighting alone male flowers appeared later than female. This disadvantage was not noted with the combined lighting, which resulted in the highest yields.

3662. Czjan Min'-čuan', and Ši Huj-fe̊n'.
A study of the characteristics of the Peking cucumber house. [Chinese, with Russian summary 1½ pp.]
Acta agric. sinica, 1957, **8**: 330-46, illus.

These are mansard-type, lean-to glasshouses facing south, the glass being inclined at 15° and 38° to the horizontal and extending to ground level with the heating system in the rear section. A study was made of the daily and seasonal changes in temperature and light intensity in them. Under normal conditions the mean temperature was 22–27° C. by day and 15–16° C. at night, the average temperature for the growing season being 20·2° C. In daytime maxima occurred beneath the upper slope and minima at the soil surface; during the night, however, the maxima were beneath the roof of the heating section and minima where the glass reached ground level. Mean light intensity was 70,000–100,000 lux at midday and 2,000–2,500 in the morning and evening. At the front of the house the spring light intensity was 65,000 lux and the winter 42,000, but at the back at ground level it fell to 53,000 and 1,500 lux respectively, resulting in the spring crops being 33% heavier than the winter ones. The light intensity also varied from top to bottom, the figures for average intensity at 3 p.m. in winter being: front 50,711, back 28,678, top 49,333, bottom 16,966 lux. Cucumbers grown in the front part of the house, owing to this favourable combination of temperature and light, gave 45% greater yields than those at the rear.

3663. Aalders, L. E.
Monoploidy in cucumbers.
Diss. Abstr., 1957, **17**: 2775, being *Publ.* 24,050 of 58 pp.

The vigour of monoploid cucumbers was below that of the best diploids, and equal to or slightly above that of the poorest diploids. Few male flowers were produced by monoploid plants, but the number of female flowers produced was similar to that on diploid plants. None of the fruits contained seeds with visible embryos.—Cornell Univ.

3664. Alex, A. H.
Honeybees aid pollination of cucumbers and cantaloupes.
Progr. Rep. Tex. agric. Exp. Stat. **1936,** 1957, pp. 4, and *Glean. Bee Cult.*, 1957, **85**: 398-400, from abstr. in *Bee World*, 1958, **39**: 136.

In an experiment carried out at College Station, Texas, in 1956, cucumbers in plots screened against honeybees yielded an average of 89 bushels/acre, whereas in screened plots containing bees and in open plots yields were approximately 5 and 6 times as great, respectively. Similarly cantaloupes yielded only 38 83-lb. crates/acre when screened against bees and more than 8 times as much when screened with bees or grown in the open.

3665. Knyš, A. N.
Cross-pollination of cucumber varieties in relation to isolation and viability of pollen. [Russian.]
Sad i Ogorod, 1958, No. 6, pp. 13-16.

In experiments in the Ukraine no cross-pollination occurred between 2 distinct cucumber varieties when grown on small plots (250 sq. m.) 500 m. or more apart or on larger plots (0·20 ha.) 1 km. or more apart. A study of pollen viability showed that pollen carried by bees to a distance of 500 m. or more rapidly lost its viability as a result of the desiccating effect of the strong air current produced by the insects during flight. Pollen carried by marked bees to a distance of 500 m. only germinated in 3 cases out of 17, and the maximum length of pollen tubes after 22 hrs was 60 μ, as against 750 μ in the controls. Pollen carried 750 m. or more did not germinate on a sugar-agar medium.

3666. Aalders, L. E.
Tolerance of cucumber pollen to X-irradiation as measured by seed set.
From abstr. in *Agric. Inst. Rev.*, 1958, **13** (3): 37.

Three varieties of cucumber were pollinated with pollen that had been X-irradiated just previously. X-ray dosages used were nil (control), 10,000r, 20,000r, 30,000r, 40,000r and 50,000r. Fruit set was good following all six treatments. Seed set for the 10,000r treatment was only about 1% of the control, and fo the higher dosages it was practically nil.—Canada Dep Agric., Kentville.

3667. Fröhlich, H., and Henkel, A.
Über Standweiten bei der Freilandgurke. **(The spacing of outdoor cucumbers.)**
Dtsch. Gartenb., 1958, **5**: 134-6, bibl. 3, illus.

On both a light and a heavy soil cucumber yields were highest with 2 plants at a site, the sites spaced 0·77 × 0·77 m., when compared with 1 plant at 1·50 × 0·25 m. Increased yields balanced the extra cultivation. On both soils celeriac interplanted between cucumbers planted at 1·20 × 0·50 m. (2 plants) gave satisfactory yields without adversely affecting cucumber growth or yield.—Inst. Gartenb., Grossbeeren.

3668. Waggoner, B. E.
Spacing and fertilizing cucumbers.
Miss. Fm Res., 1958, **21** (3): 2.

Maximum yield per acre was obtained with a plant spacing of 1 ft (row spacing constant at 6 ft) and N application at 16 lb./acre (P and K rates constant at 64 lb./acre each).

3669. Ito, H., and Saito, T.
Factors responsible for the sex expression of Japanese cucumber. (IX.) Effects of nitrogen application and watering under controlled day length and night temperature in the nursery bed. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1958, **27**: 11-20, bibl. 2, illus.

Short day length and low night temperature favoured female flower formation but, under the opposite conditions, the effect of N supply and watering became marked. Abundant N arrested female flower formation, particularly under restricted watering. The number of nodes preceding the first female flower was reduced by low N supply. Luxuriant growth was followed by more numerous staminate flower nodes. For early pistillate flower formation, therefore, nitrogen and water supply in the nursery should be moderate, especially under unfavourable day length and night temperature conditions. [For Part VIII, see *H.A.*, 28: 2575.]

3670. Geissler, T.
Der Nährstoffentzug einer frühen Treibgurkenkultur. **(Nutrient uptake by early cucumbers.)** [Russian and English summaries 1¼ pp. each.]
Arch. Gartenb., 1957, **5**: 431-66, bibl. 16.
Der Nährstoffbedarf der Treibgurke. **(Nutrient requirements of glasshouse cucumbers.)**
Dtsch. Gartenb., 1957, **4**: 316-18.

Analyses of cucumber plants after forcing showed the following average contents per plant: 371·37 g. ash, 46·03g. N, 25·25 g. P_2O_5, 94·85 g. K_2O, 73·38 g. CaO and 13·39 g. MgO. Nitrogen, K_2O and P_2O_5 accumulated mainly in the fruits, with ash, CaO and MgO in the leaves. Nutrient contents of stems were low, and those of roots were below 1%. There were changes in nutrient distribution during early stages of growth, but after mid-May nutrient distribution remained relatively static. Uptake of P_2O_5 and MgO was fairly regular throughout growth, but there was a sharp drop in uptake of CaO, K_2O and N early in the season, followed by a gradual increase. Soil analyses before and after growing cucumbers showed that nutrient levels may be ten times the amounts required by the plants. Water uptake by cucumber plants averaged 0·315 l. per g. dry matter. A water supply of 2·19 l. per day per plant was not considered to be sufficient, because sub-soil water during the culture period was reduced from 20% to 7·5%.

The second article is a summarized version of the work. —Inst. Gartenb., Grossbeeren.

3671. Hoppmann, R., and Harnisch, K.
Praktische Erfahrungen bei der Gurkenveredlung. (**Practical experience in cucumber grafting.**)
Dtsch. Gartenb., 1958, **5**: 151-3, bibl. 5, illus.

Costs of growing grafted cucumber plants were 55·5% higher than those of growing ungrafted plants. Increased yields from grafted plants, however, gave profits more than 8 times the extra cost of raising them.

3672. Awdejew, J. T.
Kälteresistente Gurken- und Tomatenbastarde. (**Cold-resistant cucumber and tomato hybrids.**)
Schweiz. Gärtnerztg, 1958, **61** (25): 3, illus.

Vegetative hybrids of cucumber on watermelon and sugar melon stocks were able to stand spring frost injury (–4° C.), and fruits ripened earlier than on ungrafted controls.

3673. van der Kroft, W. G.
Achttien jaar onderzoek in de augurkenteelt. (**Eighteen years of research on gherkin growing.**) [English summary ½ p.]
Meded. Dir. Tuinb., 1958, **21**: 266-76, bibl. 8, illus.

The two main achievements which are discussed are breeding a mosaic-resistant variety, and grafting on resistant rootstocks to control attack by fusarium root rot. Research is in progress on breeding for resistance to anthracnose, which is at present controlled by maneb or karathane.—Proeft. Noord-Limburg, Venlo.

3674. deZeeuw, D. J.
Cucurbit powdery mildew fungicide trials, 1956-57.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 811-21, bibl. 8, illus.

Karathane and the new fungicides Carbide and Carbon Chemical 9116 and Naugatuck Thioneb appeared capable of controlling *Erysiphe cichoracearum* and to have low phytotoxicity to cucumber and other cucurbits in the greenhouse. Carbide and Carbon 9688 and 10521 and Thioneb also appeared effective in the field.

3675. Turlygina, E. S.
A new method of gall nematode control. [Russian.]
Priroda, 1958, **47** (5): 95-6, illus.

In trials with artificially infested cucumbers grown in pots, one application of 0·25% potassium thiocyanate or sodium salicylate or 3 applications of 1% ammonium nitrate greatly reduced the fertility of the female nematodes and the number of galls on the roots.

3676. Carolus, R. L., and Downes, J. D.
Studies on muskmelon and tomato responses to polyethylene mulching.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 770-85, bibl. 9, illus.

Black polyethylene mulching increased the yield of muskmelons, particularly the early yield, and irrigation enhanced the effect of mulching. Tomatoes also responded to plastic mulching but to a lesser extent than melons, owing, it is suggested, to the shallower root system of melons. The functions, benefits and economics of mulching are discussed.

3677. Avakjan, A. G.
Pruning agricultural plants. V. The effect of severe pruning on the yield and quality of melon. [Russian, with Armenian summary.]
Dokl. AN ArmSSR, 1956, **23** (3): 137-44, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 78,130.

In Central Asia and Armenia fruits of cucurbits, in particular melon, when late set either do not mature or have a low sugar content. When melons were pruned to retain 2 fruits and remove 19% of the leaves or retain 1 fruit and remove 59% of the leaves, the latter method produced a higher yield of ripe fruits of better quality.

3678. Reid, J.
Studies on the fusaria which cause wilt in melons. II. The effect of light, nutrition, and various chemicals on the sporulation of certain fusarial isolates, and preliminary investigations on the etiology of wilting of the muskmelon *Fusarium*.
Canad. J. Bot., 1958, **36**: 507-37, bibl. 36, illus.

Studies on the etiology of wilting indicated that the muskmelon *Fusarium* [*F. oxysporum* f. *melonis*] produces at least 3 chemical fractions which may contribute to wilting. One was thermostable, non-dialysable, apparently a protein, and possibly an enzyme. The second was thermostable and was probably a low molecular weight carbohydrate. These two induced wilting in plant cuttings rather than in intact plants, whereas the third fraction induced wilting in plants with undamaged root systems, and was thermostable, partially dialysable, and stable through a wide pH range. Appropriate tests, however, indicated also that translocation through the vessels was significantly interfered with in plants showing incipient or more advanced wilting symptoms. [From author's abstract.] —Univ. Toronto, Ont.

3679. Malbouisson de Mello, L.
Nematódeos que parasitam o melão cantalupe no estado de São Paulo. (**Nematodes parasitic on cantaloupe melon in São Paulo state.**) [English summary ½ p.]
Rev. Agric. Piracicaba, 1958, **33**: 39-44, bibl. 11, illus.

Meloidogyne incognita and *Aphelenchus avenae* were abundant and *Helicotylenchus nannus* rare on the cantaloupe roots examined. The most economic control method is crop rotation with grasses, *Crotalaria* and peanuts, but for more effective control soil fumigation with DD or EDB is recommended.

3680. Nishida, T.
The influence of yeast hydrolysate on the behavior of the melon fly.
J. econ. Ent., 1958, **51**: 140-3, bibl. 6.

More melon flies (*Dacus cucurbitae*) were killed when yeast hydrolysate bait sprays were applied to non-host plants favoured by the adults, such as maize and *Crotalaria incana*, than when they were applied to the host plants, cucumber and melon, or to pieces of plyboard. The treatment of the host plants did not result in flies moving to them from nearby untreated maize plants. In general, the response to baits appears to decline when the supply of nectar and other natural foods is abundant.—Univ. Hawaii, Honolulu.

Legumes.

(*See also* 3236, 3237, 3240, 3242, 3249, 3250, 3258, 3261-3263, 3269, 3405, 3530, 3795d-f, i, j, 3796b, q.)

3681. Vargas, R., and Brown, L. R.
Producción de semilla seleccionada de frijol. Campaña 1957. (**Production of selected bean seed. Season 1957.**)
Inf. mens. La Molina, 1958, **32** (368): 5-7.

Of the 10 varieties in the selection tests, California L.M. 56 gave the best results, with good resistance to the main diseases, freedom from seed-borne viruses, high quality beans, and yields above 1,500 kg. per ha.

3682. Nicolaisen, W., and Fölster, E.
Das Prüfungsergebnis der Samensortiermaschine "Sortex", Type G2. (**The results of testing the seed sorting machine, Sortex, Type G2.**)
Saatgut-Wirtsch., 1958, **10**: 189-90.

The machine (R. W. Gunson Ltd., London) with its two photocells sorts large seed grains according to colour and also separates spotted from healthy seed. The efficiency of the machine was confirmed in tests with pea and bean seed carried out at the Institute of Vegetable Growing, Technical College, Hanover.

3683. Alvim, P. de T.
Efecto de atomizaciones con ácido giberélico, urea y azúcar, sobre la asimilación neta y el hábito de crecimiento del frijol. (**Effects of spraying with gibberellic acid, urea and sugar on net assimilation and growth habit of beans.**) [English summary 8 lines.]
Turrialba, 1957, **7**: 100-3, bibl. 3.

Gibberellic acid increased net assimilation rate, relative growth rate, stem dry weight, leaf area and plant height in beans. Root dry weight was reduced but leaf dry weight was not significantly altered. Reduction in root dry weight induced by gibberellic acid could be effectively counteracted by 10% sucrose sprays. Increase in net assimilation rate (photosynthesis) caused by gibberellic acid seemed to result from a more rapid translocation of photosynthates from the leaves to the stem. Urea sprays increased stem elongation of plants receiving gibberellic acid. Both sugar and gibberellic acid gave effective protection against injury by 2% urea spray. [From author's abstract.]

3684. Vargas, R.
Abonamiento en el cultivo del frijol. (**Manuring of beans.**)
Inf. mens. La Molina, 1957, **31** (365): 7-12.

Various combinations of N, P and K were supplied as guano, superphosphate and potassium chloride, keeping the N level constant. Although the soil was moderately high in K and high in P content, the beans responded to both P and K applications. The combination proving most economic and giving the highest seed yield was 30 kg. of N, 60 kg. pf P_2O_5 and 60 kg. of K_2O per ha. Doubling either the P or K application, or both, resulted in lower yields.

3685. Widdowson, F. V., and Cooke, G. W.
Comparisons between placing and broadcasting of nitrogen, phosphorus and potassium fertilizers for potatoes, peas, beans, kale and maize.
J. agric. Sci., 1958, **51**: 53-61, bibl. 5, illus.

In 2 experiments each on green peas and broad beans, placing P and K separately or together gave consistently higher yields than broadcasting these nutrients. When N was used in addition to P and K there were small gains in yield of broad beans provided the mixture was placed. There were no gains in yields of peas, however the mixture was applied. [From authors' summary.]—Rothamsted exp. Stat., Herts.

3686. Dodge, J. C., and Snyder, J. C.
Horticulture. Vegetables.
Wash. St. Res. Progr., 1958, No. 9, pp. 1-2.

The following results are included in brief summaries of research projects: Pea foot rot was associated with poor drainage and soil compaction, and root rots were reduced by high rates of gypsum (6 tons or more). In fertilizer studies with Blue Lake beans it was found that diammonium phosphate was the most satisfactory form of P; 5 lb. per acre Safte Bor F (a slowly-available form) gave the best results of B materials used; band application of K was better than broadcasting, and sulphate of potash produced higher yields than muriate. Band placement of a 90: 90: 0 fertilizer was the best for Puregold bush beans. Variety trials with peas for freezing, beans and tomatoes are reported.

3687. Schroeder, W. T., Peck, N. H., and Vittum, M. T.
Purple blight—an undescribed disorder of *Pisum sativum*.
From abstr. in *Phytopathology*, 1958, **48**: 264.

Pea plants affected by purple blight first appear stiffly erect with sparse foliation. Brownish flecking appears on the stipules and leaves, and this increases in intensity until it culminates in a purplish-black desiccation of the oldest leaves. Stems and tendrils may also show brownish blotches, but the roots remain normal in appearance. When the disorder occurs at an early stage of growth the plants produce no pods or only a very few small pods. The disorder is sporadic in occurrence and may not develop in the same area two years in succession. Experiments with soils suggest that purple blight may be of nutritional origin, possibly resulting from toxic interactions between Mn, Fe and Al.

3688. Wilson, E. M.
Rust-TMV cross-protection and necrotic-ring reaction in bean.
Phytopathology, 1958, **48**: 228-31, bibl. 6, illus.

Cross-protection between bean rust fungus, *Uromyces phaseoli typica* and tobacco mosaic virus (TMV) was demonstrated in bean leaf tissue. TMV-infected bean leaves showed a resistance to rust (apparently due to inhibition of uredospore germination); rusted bean leaves showed a resistance to TMV infection. Aqueous diffusates from uredospores, sprayed on bean leaves, protected against both rust infection and the formation of TMV local lesions in the leaves. Diffusate concentration was obtained sufficient to give 81 and 68% control, respectively, of rust pustules and TMV local lesions on Pinto bean leaves. These diffusates inhibited the germination of uredospores. Aqueous diffusates from bean leaves infected with TMV, sprayed on bean leaves, protected against rust infection. Diffusate concentration was obtained sufficient to give 72% reduction in the number of rust pustules on Pinto bean leaves. These diffusates gave protection against TMV local lesions, but so variable that the results are not considered significant. In rusted and TMV-infected bean leaf tissues, acquired self-protection was reduced by washing the infected tissue with water. [From author's summary.]—Univ. Calif., Berkeley.

3689. Buxton, E. W.
Diseases of peas.
A.R. Rothamsted exp. Stat. 1957, 1958, pp. 120-1.

The onset of wilt (*Fusarium oxysporum* f. *pisi*) was delayed by treating a wilt-sick field with DNBP, but the severity of the attack was not reduced. Among new pea varieties from New Zealand wilt incidence was 28% in Blue Prussian, 35% in Greenfeast, and 46% in Resistant Onward, compared with 100% in English Onward.

3690. Barros, O., and others.
The control of angular leaf spot of bean in Colombia.
FAO Plant Prot. Bull., 1958, **6**: 97-101, bibl. 2.

The interactions between 5 bean varieties and 4 fungicidal treatments are examined in relation to 4 diseases, of which angular leaf spot (*Isariopsis griseola*) was the most serious. Treatment with zineb plus a sticking agent at 250 gal./ha. was the most effective control treatment. Algarrobo was the highest yielding variety in both treated and untreated plots. Spraying was carried out 9 or 10 times during the season, but it is considered safe to reduce this number to 5 or 6.

3691. Becker, A.
Zur Frage der Lagerung von gebeiztem Leguminosensaatgut. **(The problem of storage of disinfected legume seeds.)**
Saatgut-Wirtsch., 1958, **10**: 132-3, bibl. 5, illus.

Pea and bean seeds treated with various mercurial materials were stored for 1 year without adversely affecting germination. Disinfection of diseased pea seeds with Cerenox (containing chinonoxim-benzoylhydrazone) resulted in better germination and growth than with Ceresan (containing Hg), but disease control was effective with both materials.

3692. Eno, C. F., and Everett, P. H.
Effects of soil applications of 10 chlorinated hydrocarbon insecticides on soil micro-organisms and the growth of Stringless Black Valentine beans.
Proc. Soil Sci. Soc. Amer., 1958, **22**: 235-8, bibl. 16.

In pot experiments with fine sandy soil, germination of beans was decreased by BHC, but increased or unaffected by heptachlor, chlordane, methoxychlor, lindane, aldrin, toxaphene, dieldrin, TDE and DDT, when soil treatment preceded sowing by 2 weeks. Root and top weights were decreased by all except heptachlor, toxaphene and methoxychlor, the first 2 of these having no effect on growth and the third reducing top weight. A further bean crop was sown 11 months after soil treatment and suffered no reduction in germination or root growth, but top growth was reduced by lindane, aldrin, TDE, DDT and BHC.

3693. Bocanegra Salazar, S., and Gonzalez B., J. E.
Comparativo de insecticidas aplicado a las semillas de frijol. **(Comparison of insecticides applied to bean seeds.)**
Inf. mens. La Molina, 1957, **31** (365): 1-6.

Activated carbon preparations of V.P. 2823, 50% Disyston and 44% Thimet were used at 1 lb. per 100 lb. of bean seed. Other treatments per 100 lb. seed were 150 g. of the active principle of either aldrin or chlordane and 100 g. of the active principle of dieldrin. The effects of these treatments on germination and on 15 species of pests are tabulated. Pests attacking the leaves were not controlled by the first 3 treatments and germination was reduced to a highly significant extent by Disyston and dieldrin.

3694. Huisman, H. O., Uhlenbroek, J. H., and Meltzer, J.
Investigations on organic insecticides. II. Preparation and acaricidal properties of substituted diphenylsulphones, diphenylsulphides and diphenylsulphoxides.
Rec. Trav. chim. Pays-Bas, 1958, **77**: 103-22, bibl. 11.

Tedion was very effective against all stages, except the adult, of *Tetranychus urticae* on beans without phytocidal effects or toxicity for warm-blooded animals.

Mushrooms.

(*See also* 3795m, n, u.)

3695. Rasmussen, C. R.
Pig manure as a substitute for horse manure in mushroom growing.
Bull. Mushroom Gr. Ass., 1958, No. 103, pp. 278-85, bibl. 7.

The results are given of 6 experiments comparing mushroom yields from beds prepared with horse manure, pig manure or synthetic compost. In the early experiments the yield from beds prepared from pig

manure was not as good as that from the other beds, but later results showed that, with suitable treatment, pig manure can be the basis of a suitable growth medium and a good substitute for horse manure. The quality of the pig manure was important; that from animals fed on swill produced poor crops, and in all cases large quantities of straw were needed in the bedding. The manure heated easily and the piles shrank quickly, which tended to cause anaerobic fermentation. Less water was needed during composting, and only about half the area of beds could be filled per ton, compared with horse manure. Preheating the compost before laying down the mycelium was found to be important, but the addition of inorganic supplements either had no effect or reduced the yield.—Mushroom Res Stat., roy. vet. agric. Coll., Copenhagen.
J.R.L.

3696. Cleary, J. P.
Control of cobweb diseases of mushrooms.
Plant Path., 1958, **7**: 74-5.

Dusting with 20% PCNB at the pinhead stage and after the first flush gave excellent control of *Dactylium dendroides*. After treatment, 1,100 sq. ft of bed produced 1,876 lb. of marketable mushrooms, while before treatment yields had been 300 lb. Mixing PCNB with the casing soil before casing suppressed mycelial growth and mushroom production.—N.A.A.S., Leeds.

Onions and allied crops.

(*See also* 3526, 3796c.)

3697. Rios, E. de C.
Chemical composition of some varieties of onion.
An. Asoc. brasil. Quim., 1957, **13**: 37-43, from abstr. in *J. Sci. Food Agric.*, 1958, **9**: i-276.

Analytical data are presented for the variety Baia grown on 3 soils. The values are compared with those obtained for Egyptian onions. The results of onion seed analyses and the physical constants of onion seed oil are given.

3698. Šmatok, I. D.
Seasonal dynamics of ascorbic acid in the leaves of plants under Arctic conditions. [Russian, with English summary 10 lines.]
Fiziol. Rast., 1958, **5**: 345-9, bibl. 15.

The date at which the ascorbic acid content of the leaves of plants was highest varied with season and with species. In rhubarb, sorrel, lungwort and onion the maxima occurred in the spring. In other plants, including garlic, ascorbic acid contents tended to increase in September with the onset of prolonged autumn frosts.

3699. Corrales Macedo, A.
Produccion de semilla botánica de cebolla 1957. (**Production of onion seed, 1957.**)
Inf. mens. La Molina, 1958, **32** (367): 1-6.

Seed produced near Lima, Peru, in preliminary trials in 1956 [see *H.A.*, 28: 458] was sown in June 1957 and yielded 15·5 kg. per ha. of clean, ripened bulbs. Selected bulbs were placed in cold storage and removed in 4 instalments for planting from mid May to early July after 80, 100, 120 and 140 days' storage. Guano was applied as a top dressing at 100 kg. of N per ha. The highest seed yield of 148·92 kg. and the second highest bulb yield, 16,000 kg. per ha., were from the mid-June planting after 120 days' storage. The lowest seed yield, 78·24 kg. per ha. and the highest bulb yield, 19,000 kg., were from the earliest planting, i.e. after 80 days' storage. Better results, particularly in seed yield, were obtained with 100 than with 140 days' storage. The percentage germination was 80 in seed from the early planting and 90–91 in the 3 later series. The improvement on the previous year in both yield and quality of seed was probably attributable to the use of the guano.

3700. Hori, Y., and others.
Unfavourable effect of cabbage cropping on the onion crop which follows, an example of the deterioration of soil productivity in vegetable areas. (I.) [Japanese, with English summary ¾ p.]
J. hort. Ass. Japan, 1958, **27**: 1-10, bibl. 14, illus.

Poor onion yields are thought to be due to nutrient unbalance and high soil acidity following applications of 1,500 to 3,000 lb./acre ammonium sulphate with insufficient P and K to the preceding cabbage crop.

3701. Mathur, P. B., and others.
Effects of pre-harvest foliage sprays of maleic hydrazide on the cold-storage behaviour of onions.
J. Sci. Food Agric., 1958, **9**: 312-16, bibl. 8.

Onions were sprayed with 200, 400 or 600 p.p.m. maleic hydrazide 18 days before harvest. After harvest the bulbs were stored at 2 temperature ranges, viz. 59–87° F., R.H. 45–78%, and 32–35° F., R.H. 80–90%. Maleic hydrazide reduced weight loss, inhibited rooting, substantially inhibited sprouting and depressed respiration rate, compared with the untreated controls, the effects being greatest with the highest concentration of spray. Inhibition was greater at the higher than at the lower temperature range. The sprays also reduced wastage due to fungus diseases (*Aspergillus niger* and *Rhizopus nigricans*) in bulbs stored at both temperature ranges, the effect being greater at the lower range.—Centr. Food technol. Res. Inst., Mysore.

3702. Inoue, T., and Ogata, K.
Studies on the physiological action of maleic hydrazide on subterranean crops and seeds. (3) The effect of MH on sprout inhibition, growth substances, and respiration in onion bulbs and green gram seed. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1958, **27**: 49-52, bibl. 17.

Growth inhibition in stored onions due to MH appeared to be caused by partial suppression of respiration rather than by any change in the growth substances present. [For Part 2 see *H.A.*, 27: 3512.]

3703. Photiades, T.
Sprout control of ware onions.
Countryman, Nicosia, May 1958, pp. 12-13, illus.

Sprouting was controlled for periods up to 1 year by field spraying 336 drams per donum of maleic hydrazide containing 40% acid equivalent in 50 gal. water two weeks before harvest.

3704. Ehlers, M., and Liedtke, G.
Zur Frage insektizider Rückstände im Gemüse nach Anwendung der Saatgutbekrustung mit Dieldrin. (**The problem of insecticidal residues in vegetables after seed pelleting with dieldrin.**) [English summary 18 lines.]
NachrBl. dtsch. PflSchDienst., Braunschweig, 1958, **10**: 87-90, bibl. 5.

In onions dieldrin residues after seed pelleting were below 0·1 p.p.m. Residues in radishes and carrots varied according to cultural and environmental factors, and sometimes exceeded this level. There was some localization of residues in the root epidermis. From the results obtained dieldrin did not appear to act in a systemic manner.—Hauptlab. Schering A.G., Berlin.

3705. Couto, F. A. A.
Efeito do espaçamento na produção de alho. (**Effect of spacing on yield of garlic.**) [English summary ½ p.]
Rev. Ceres, 1958, **10**: 288-99, bibl. 16.

Yield per unit area was reduced and bulb size increased by widening the spacing for garlic, particularly between plants in the row. The plant spacings compared ranged from 5 to 17·5 cm., with a constant distance of 40 cm. between rows, and in another experiment the plants were all 10 cm. apart and distances between rows ranged from 20 to 50 cm. Marketable bulbs and good yields were obtained with plants 7·5–12·5 cm. apart. Row spacing should be as close as is consistent with the methods of weeding and irrigation practised, but at 20 cm. the spacing between plants should not be less than 12·5 cm.

3706. Adamson, R. M.
The effect of different drying treatments on the germination of leek seed.
From abstr. in *Agric. Inst. Rev.*, 1957, **12** (3): 39.

A 6-year study was made on the effect of different drying treatments upon the germination of leek seed harvested at a semi-mature stage in mid-October. A continuous temperature of 80° F. was the only drying treatment which resulted in a seed germination of 65% or over in each year in which it was tested. In two seasons favourable for the maturing of leek seed, a continuous temperature of 95° F. or 80° F. for periods up to 10 days followed by 95° F. resulted in germinations equal to that obtained with the continuous 80° F. temperature. Drying the seed heads at 110° F. or over, or 80° F. for periods up to 10 days followed by 110° F. or over, failed to produce seed which reached 65% germination, the minimum required for leek by the Canadian Seeds Act.—Canada Dep. Agric., Saanichton.

Rhubarb.

See 3795v.

Root crops.

(*See also* 3238, 3265, 3569, 3636, 3644, 3704, 3733, 3734, 3796k.)

3707. Wybenga, J. M., and Lehr, J. J.
Exploratory pot experiments on sensitiveness of different crops to sodium: E. Red table beet.
Plant and Soil, 1958, **9**: 385-94, bibl. 9.

All the plants received the same supplies of P, Mg, B, Mn, Fe and Cu. The alternative sources of N were nitrate of lime and Chilean nitrate of soda, each applied in 3 instalments, with K at 2 levels (600 and 1,600 mg. per pot) as chloride. In a further series both N and K were supplied, the latter at 1,300 and 1,840 mg. per pot, as Chilean nitrates of potash containing respectively 10% and 14% of K_2O. The beneficial effects of Na on leaf development were apparent at an early stage. Even at the high K level, yields of tops and roots were lower with nitrate of lime than with either of the Chilean nitrates, with or without K. In the sodium nitrate series, increasing K raised the fresh-weight yield of leaves and reduced that of roots, but in the nitrate of lime series it raised both. The highest leaf yield was from the nitrate containing 14% of K_2O, and the highest root yields from sodium nitrate without K, and from the potassic nitrates. Dry matter percentages in tops and roots were highest in the nitrate of lime series. Chemical composition and intensity of red pigmentation are recorded for leaves and roots. Both P and crude protein in roots were increased by Na, and the deepest pigmentation of roots was found in the potassic nitrate series. [For part A on spinach, see *H.A.*, 20: 860.]

3708. Braak, J. P., and Kho, Y. O.
Some observations on the floral biology of the carrot (*Daucus carota* L.). [Dutch summary ¾ p.]
Euphytica, 1958, **7**: 131-9, bibl. 9, illus.

There were indications that the production of male flowers has a genetical basis, but that there is also some environmental influence. Male sterility was found in 2 cultivated varieties and may be of importance in the production of hybrid seed. Under *Lygus*-free conditions seed set averaged 70%.—Inst. hort. Plant Breeding, Wageningen.

3709. Lehoczky, J.
A sárgarépa sztemfiliumos feketerothadásának hazai előfordulása. (**The incidence of black rot of carrots in Hungary.**) [English and Russian summaries 3 pp. each.]
Kert. szől. Főisk. Évk., 1956, **20** (4 part 7): 3-36, bibl. 16, illus. [received 1958].

The etiology of the disease and the biology of its causal organism, *Stemphylium radicinum*, are discussed. Among remedial measures, in addition to control during growth and storage of seed plants quoted from the literature, the results of seed treatment tests are given. Higosan (methoxyethyl mercurous chloride) and silver nitrate dips, both at 2‰ for 15–20 min., gave complete protection, as did Germisan (organic mercury preparation) dust at 5 g./kg.

3710. Kuiper, K., and Drijfhout, E.
Bestrijding van het wortelaaltje *Hoplolaimus uniformis* Thorne 1949 bij de teelt van peen. **(Control of root nematode in carrot growing.)** [English summary ¼ p.]
Reprinted from *Meded. LandbHogesch. Gent*, 1957, **22**: 419-26, bibl. 6, illus.

Soil fumigation with DD and with formalin appeared to give 90% control of *Hoplolaimus uniformis* and improved carrot growth. Crop rotation also improved yields, and yields after potatoes were better than those after beet or carrots.—PlZiekt. Dienst, Wageningen.

3711. Salkeld, E. H., and Scott, H. E.
Tests of insecticides and application methods against the carrot rust fly in the peat-muck soil of the Holland Marsh, Ontario, 1949-1954.
J. econ. Ent., 1958, **51**: 165-8, bibl. 13.

The results are summarized of a series of tests with various insecticides against *Psila rosae* on both early and late carrot crops. In three-fifths of the tests the results had to be disregarded because of low infestations in the control plots. The results obtained from the remaining tests have led to the following recommendations for controlling carrot fly in Ontario and eastern Canada: *Early carrots:* (1) A preplanting soil treatment of granulated chlordane or aldrin, or of heptachlor dust, at 4 lb. of toxicant per acre worked into the top 3 to 4 inches of soil; or (2) foliage dusts or wettable powder sprays of chlordane, 2 lb. of toxicant per acre applied when the flies appear in the field and 10 days later. *Late carrots:* A preplanting soil treatment of granulated chlordane or aldrin, or of heptachlor dust, at 6 lb. of toxicant per acre worked into the top 3 to 4 inches of soil; or a wettable powder or an emulsifiable concentrate spray of any one of these insecticides at 6 lb. of toxicant.—Ent. Lab., Ottawa.

3712. Smith, W. H.
Washing of maincrop carrots.
Agriculture, Lond., 1958, **65**: 227-30.

Trials with standard commercial types of washing machine are described. All caused considerable surface damage, the spray-chest type least of all but this machine often failed to clean in surface depressions. Washing did not cause much increase in the amount of rotting of roots held for 2 weeks at 50° and 60° F. Washing slightly increased the number of broken roots but hardly affected the amount of wilting and number of split roots.—Ditton Lab., D.S.I.R.

3713. Mikaelsen, K., Brenna, H., and Roer, L.
Effects of gamma rays on sprouting and growth during storage in carrots and potatoes.
Proc. int. Conf. peaceful Uses atom. En. 1955, 1956, **12**: 208-10, bibl. 3, illus. [Received 1958.]

Carrots were exposed to 5,000, 10,000 and 15,000r of gamma rays. The two higher dosages prevented sprouting during 8 months' storage, and the lowest dose checked it considerably.

3714. Watts, L. E., and George, R. A. T.
Classification and performance of varieties of radish.
A.R. nat. Veg. Res. Stat., Wellesbourne, for 1957, 1958, pp. 15-27, bibl. 9.

One hundred and fourteen varieties were subdivided into 31 groups based on root and leaf shape and size. Details of performance are also given.

3715. Hagiya, K.
Studies on the occurrence of "pithy tissue" in root crops. (5) On the occurrence of "pithy tissue" in F_1 and F_2 generations of varietal crosses in radish with reference to breeding for resistance. [Japanese, with English summary ¾ p.]
J. hort. Ass. Japan, 1958, **27**: 68-77, bibl. 16, illus.

The genetics of pithiness is discussed. Pithiness is thought to result not from specific genetic factors but from a number of factors which are responsible for unbalanced root development. It is suggested that parent plants should be selected on a basis of high percentage soluble matter in the sap of crushed root-tips. [For earlier parts see *H.A.*, 23: 1921 and 3139, and 28: 469 and 470.]

3716. Tashima, Y.
Ein Beitrag zur Physiologie der Blütenbildung von *Raphanus sativus* mit besonderer Rücksicht auf die Vernalisation. **(A report on the physiology of flower formation in radish, with particular reference to vernalization.)**
Mem. Fac. Agric. Kagoshima Univ., 1957, **3**: 25-58, bibl. 109, illus.

The effect of vernalization on radish seed was apparent after 5 days at 1–5° C. and marked after 15 days at 1–5° C. The initial phase was unstable at a high temperature (30° C.); the final phase was not reversible. Vernalized seedlings formed flowers more quickly in long days and in darkness than in short days. Replacement of an induced growing point by a vegetative tip, by grafting, removed the effect of vernalization.

3717. Singh, K., and Pollard, A. G.
Relationship between soil structure, soil cultivation, nitrogen uptake and crop growth. III. Effects of cultivation on the porosity of soil and its compactness and on crop development and yields. IV. Effects of cultivation on nitrate accumulation in soil, nitrogen uptake and crop growth.
J. Sci. Food Agric., 1958, **9**: 454-62, bibl. 10, and 463-72, bibl. 8.

Part III. Cultivation treatments examined consisted of deep ploughing (8 in.), shallow ploughing (4 in.) and surface treatment (2 in.) with a tine cultivator. There were no apparent differences between the types of cultivation in respect of "stand", dry weight or final yield of swedes, except that in the early stages of growth on unmanured plots deep ploughing produced greater weights of crop than did either shallow ploughing or tine cultivation. Neither aggregation nor pore space was associated with any other plant characteristics examined. *Part IV.* Crops of swedes were grown in a dry season and a wetter season, with and without nitrate fertilizer, using the 3 cultivation treatments described above. Ploughing had no advantage over tine cultivation as regards crop yield or nitrate accumulation in the soil. The application of N fertilizer did not affect the accumulation of nitrates in the soil or the N uptake or crop growth in either season. No significant differences existed in nitrate-N content of soil, in N content (%) of crop, in N in total dry matter per acre or in dry matter and yields between the fertilized and unfertilized plots.—Imp. Coll. Sci. Technol., London.

3718. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med udstrøning og udsprøjtning af boraks til kålroer. Foreløbig meddelelse. **(Trials with broadcasting and spraying borax on swedes. Preliminary report.)**
Tidsskr. Planteavl, 1958, **62**: 339-40.

Boron deficiency in swedes growing in a sandy soil was corrected by broadcasting 30 kg. borax per ha. in spring before sowing, or by sprays of 10 or 15 kg. borax applied in mid-June. Later spray applications were much less efficient.

3719. Shibutani, S., and Isoda, R.
Flower-bud formation in turnip varieties.
[Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1958, **27**: 45-8, bibl. 7.

Forty varieties were classified as Japanese, Western European or Intermediate types. With Japanese varieties, the time required from sowing to formation of visible flower buds was 40–63 days with spring planting and 45–66 days with autumn planting. Western European varieties took much longer.

3720. Iwata, M.
Influence of the forms of nitrogen supplied on the growth of vegetable crops. (II.) Effects of varying concentrations of nitrogen in different forms on the growth of turnip.
[Japanese, with English summary ¾ p.]
J. hort. Ass. Japan, 1958, **27**: 21-31, bibl. 20, illus.

Turnips in sand culture under glass were supplied, in one experiment, with 5 forms of N at 6 concentrations, and in another with 3 forms of N at 9 concentrations. The effects of the different forms and concentrations on leaf growth and colour, and on contents of N, P, K, Ca, Mg and ascorbic acid are described. [For part I see *H.A.*, 24: 2640.]

3721. Hortenstine, C. C., Ashley, D. A., and Wear, J. I.
An evaluation of slowly soluble boron materials.
Proc. Soil Sci. Soc. Amer., 1958, **22**: 249-51, bibl. 11.

Finely powdered glass frits containing B were applied to soil at rates equivalent to 5, 10 and 25 lb. per acre in greenhouse tests with turnips. Yields of tops were unaffected, but in nearly every case there was a distinct, although not significant, increase in root yield. Increase in foliar B was highly significant and related to the rate of application.

3722. Kedrov-Zikhman, O. K.
Co^{60} in the study of the role of cobalt as a micro-element in the nutrition of plants.
[Translated from Russian.]
Proc. int. Conf. peaceful Uses atom. En. 1955, 1956, **12**: 123-9, bibl. 20. [Received 1958.]

Turnips growing in unlimed soil did not significantly respond to Co, but those in limed soil responded by slight yield increases of both tops and roots. With Co^{60}, however, on both soils there was a yield decrease, slight for roots but more distinct for tops. On unlimed soil, the respiration rate of turnip leaves was increased by Co and more markedly by Co^{60}, but on limed soil the increase from either was negligible. Depression of catalase activity on unlimed soil was greater with Co than with Co^{60}, but on limed soil both increased this activity. Lime increased, but Co and particularly Co^{60} decreased, yields of radish plants and roots. Accumulation of Co in the different parts of radish plants showed wide variation, but was high in the fine rootlets and many times higher without than with lime.

3723. Doyle, A., and Corrivault, G. W.
Repression de la mouche du navet *Hylemya* sp. **(Control of the turnip fly, *Hylemyia* sp.)**
Rep. Que. Soc. Prot. Plants, 1957, 1958, **39**: 71-5, bibl. 3.

Dieldrin, 50% w.p. at 10 lb./acre, or aldrin, 2½% at 100 lb./acre, applied in the furrow before sowing gave good control, but the same insecticides applied to the surface of the land before seeding had little effect.

Salad crops.

(*See also* 3795a, h, t, 3796a, d, n, w, y.)

3724. Miller, C. O.
The relationship of the kinetin and red-light promotions of lettuce seed germination.
Plant Physiol., 1958, **33**: 115-17, bibl. 5.

Although kinetin promoted germination in darkness it was more effective if the seeds were briefly exposed to weak red light. Kinetin increased the efficiency with which the photo-reaction brought about germination even when supplied after the light reaction was completed. Far-red light partially reversed the germination promotion caused by exposing kinetin-soaked seeds to red light, but promoted the germination of kinetin-soaked seeds kept wholly in the dark.—Ind. Univ., Bloomington.

3725. McIlrath, W. J., and Bogorad, L.
Photoperiodic floral induction of *Xanthium* and germination of lettuce seeds implanted in the petioles.
Bot. Gaz., 1958, **119**: 186-91, bibl. 9, illus.

The germination of lettuce seeds implanted in petioles of *Xanthium* plants under light-tight aluminium foil wrappers showed an inverse correlation with the duration of the photoperiod to which the host plants were exposed. This lettuce-seed-germination response appeared to be directly related to the duration of light to which the *Xanthium* plants were exposed rather than to the total light energy they received. The evidence thus far obtained strongly suggests that the germination response is correlated with metabolic changes associated with floral induction of the host *Xanthium* plants. The germination response can be interpreted as an inhibition of germination of seeds implanted in petioles of *Xanthium* plants exposed to long-day conditions, although a stimulation of germination when the host plants are under short days has not been excluded. The identity of the naturally occurring inhibitor is not known; the possibility of its being xanthinin, coumarin, or indoleacetic acid has been eliminated. The site of the perceptive, and perhaps synthetic, reaction(s) which leads to the observed responses appears to be in the leaf blades. [Authors' summary. See also *H.A.*, 26: 677.]—Univ. Chicago.

3726. Lowig, E.
Saatgut-Lagerschäden an Salat-Keimpflanzen. **(Damage to lettuce seed during storage.)**
Saatgut-Wirtsch., 1958, **10**: 160-2, illus.

Fourteen months' storage of lettuce seed in 10 g. bags [at temperatures not stated] resulted in a severe decline in germination capacity and in abnormalities in germinating seed. Seed stored in 2 kg. bags under the same conditions germinated well.

3727. Booth, A.
Non-hormonal growth promotion shown by aqueous extracts.
J. exp. Bot., 1958, **9**: 306-10, bibl. 11.

Bioassay of chromatograms of aqueous potato-sprout and -tuber extracts and lettuce-seed extracts, with the coleoptile, straight-growth test, indicates the presence of a growth promoter running near to the position of IAA and giving a spray colour reaction with Ehrlich reagent similar to that of IAA. It is shown that both promotion and spray colour are due to sugars. It is concluded that major nutrients may give large growth effects in this bioassay and that in certain cases ether extracts may contain quantities of these large enough to give rise to growth effects. [Author's summary.]—Manchester Univ.

3728. Serzedello, A., Simão, S., and Whitaker, N.
Ação do ácido giberélico em cultura de alface (*Lactuca sativa* Linneu). **(Action of gibberellic acid on a crop of lettuce.)** [English summary ¼ p.]
Rev. Agric. Piracicaba, 1958, **33**: 117-22, bibl. 6, illus.

Lettuce plants were sprayed when 8 weeks and again when 11 weeks old with 100 ml. each of aqueous gibberellic acid at 1, 10 or 50 mg. per l. The chlorosis resulting from the lowest concentration was slight, and lasted only 4 days. At the higher concentrations it was severe for 6 days and the full colour was not regained. None of the treated plants formed a heart, but leaves were larger than normal, and bolting occurred at 10 and 50 mg. per l., the stems averaging 23 and 32 cm. in height respectively. There was some evidence of movement of the solution through the soil, in that untreated plants in control plots adjoining the treated plots were distinctly larger, heavier and paler than those in a neighbouring bed.

3729. Couto, F. A. A.
Influência da poda de fôlhas de alface e chicória, na época do transplante, sôbre a precocidade de colheita e produção. **(Effect of removing leaves when transplanting lettuce and endive, on harvesting date and yield.)** [English summary 1¾ pp.]
Rev. Ceres, 1958, **10**: 238-49, bibl. 7, illus.

All control seedlings were transplanted intact, the lettuce plants having 6–7 leaves and the endive plants 5–6 leaves. Test lettuces were allowed to retain either the basal 4 cm. of every leaf or the whole of the 2 or 4 youngest leaves. No treatment significantly affected either survival or the average weight per plant at harvesting, which was spread over 6 cuttings. In the first 4 cuttings, production was significantly higher from 4-leaved and control plants than from the others. The 2-leaved plants showed the slowest development and the lowest total production, but total differences between treatments were not significant. The endive seedlings were left with either the basal 5 cm. of every leaf, the 3 youngest leaves or the largest and smallest leaf. All were harvested together, the 3-leaved plant showing the highest production, followed closely by the controls. The 2-leaved plants gave slightly higher results than those left with only parts of leaves, but differences throughout were less pronounced than with lettuce.

3730. Winsor, G. W., and Davies, J. N.
A critical re-examination of the conventional conductivity (pC) test for soluble salts in soils.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 84-92, bibl. 14, illus.

Addition of soluble fertilizer above the 0·25% level markedly reduced the growth of lettuce, whereas the addition of calcium sulphate had no significant effect. Conductivity tests for soluble salts in glasshouse soils are discussed in detail.

3731. Brook, M., and Chesters, C. G. C.
The use of tetrachloronitrobenzene isomers on lettuce.
Ann. appl. Biol., 1958, **46**: 159-66, bibl. 9, illus.

Field experiments were carried out from 1951 to 1955 on winter lettuce plants grown in boxes under glass and in the open, and on commercial crops in unheated glasshouses. Each of the three isomers of tetrachloronitrobenzene, applied as 5% dusts at ¼ and ½ oz. per square yard of bed, gave significant protection against *Botrytis* disease, but the 2: 3: 4: 5 isomer was inferior to the other two isomers and they all delayed the hearting of the crop. The 2: 3: 4: 5 isomer at both rates of application and the 2: 3: 5: 6 and 2: 3: 4: 6 isomers at ½ oz./sq. yd delayed hearting of a commercial crop by more than 14 days and are not recommended at these rates. Local overdoses of fungicide should be avoided. [Authors' abstract.]—Univ. Nott.

3732. Fry, P. R.
The relationship of *Olpidium brassicae* (Wor.) Dang. to the big-vein disease of lettuce.
N.Z. J. agric. Res., 1958, **1**: 301-4, bibl. 8.

Field observations and inoculation experiments suggest that *O. brassicae* is the cause of big-vein disease of lettuce. Soil treatment with captan, phygon, copper oxychloride or thiram reduced incidence of big-vein.—D.S.I.R., Auckland. J.R.L.

3733. Hahn, S.
Wurzelgallenälchen (*Meloidogyne hapla* Chitw.) als Freilandschädlinge an Salat und Möhren. **(Root gall eelworms as pests of lettuce and carrots grown out-of-doors.)** [English summary 16 lines.]
NachrBl. dtsch. PflSchDienst., Braunschweig, 1958, **10**: 123-6, bibl. 12, illus.

Meloidogyne hapla was found as a pest of lettuce and carrots grown out-of-doors around Mainz and Giessen. With infested carrots branching and growth of the roots were generally affected. In the case of lettuce, however, crop damage was less serious as the heads showed no injury, except when the larvae infested very young plants. Soil fumigation with DD or Vapam greatly reduced or eliminated the nematodes.—Inst. Phytopath, Justus-Liebig Univ., Giessen.

3734. Wene, G. P.
Control of *Nysius raphanus* Howard attacking vegetables.
J. econ. Ent., 1958, **51**: 250-1, bibl. 1.

Good control of the bug *Nysius raphanus* was obtained with all but 2 of 15 insecticides applied as dusts to turnips and as dusts or sprays to lettuces. Malathion sprays were among the effective compounds, but, unlike the other materials tested, they caused the dead insects to adhere tightly to the leaves.—Tex. agric. Exp. Stat., Weslaco.

3735. Branan, N. C., and Toussaint, W. D.
Better ways to handle lettuce.
Res. and Fmg N.C., 1958, **16** (4): 7, illus.

The use of a trailer with a grading and packing team was the best method tested of handling lettuce in the field. In general hydrocooling was cheaper than vacuum cooling.

3736. Smith, W. H.
Refrigeration and marketing of watercress.
Agriculture, Lond., 1958, **65**: 132-5, illus.

Hydrocooling the conventional chips under running cold water and packing with 2 or 3 lb. crushed ice per chip enabled the cress to be marketed with less wastage. A description is given of an experimental pack using polythene-lined corrugated cardboard cartons with added ice in sealed polythene bags, which would keep the produce fresh for longer periods of up to 48 hours. [See also *H.A.*, 28: 1546j.]—D.S.I.R., Ditton Lab., Kent.

Spinach.

(*See also* 3635, 3636, 3790.)

3737. Kagawa, A.
Studies on the floral induction of slow-bolting spinach. (III.) The influence of the time of planting and interaction between vernalization and photoperiod upon flowering of spinach. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1958, **27**: 53-9, bibl. 22, illus.

Plants grown from unvernalized seed and from seed vernalized for 1, 2 and 4 weeks were exposed to photoperiods of 8, 10–14 and 24 hours. Vernalization caused earlier flowers in greater number at all photoperiods over 8 hours. The longer the chilling period or the daylength, the greater the acceleration of flowering; both appeared to hasten flower induction to the same extent. For the variety tested, King of Denmark, the critical photoperiod necessary for flowering after vernalization was 8–13 hours. [For Part II, see *H.A.*, 28: 2664.]

3738. Hamada, A.
Effect of maleic hydrazide in controlling bolting in spinach. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1958, **27**: 60-2, bibl. 5, illus.

The most effective concentration was 0·25% in the field and 0·10% on potted plants, applied a week before bolting would normally occur. The effect of the spray lasted 7 to 10 days; a second spray caused yellowing and dwarfing, and death after 30 days.

3739. Walton, R. R., and Kantack, B. H.
Biology and control of the seed-corn maggot on spinach foliage.
Bull. Okla agric. Exp. Stat. **B-506,** 1958, pp. 20, bibl. 5.

Non-systemic contact insecticides gave control of *Hylemyia* [*Delia*] *cilicrura* only on small plants with open leaf clusters. Phosdrin, 0·12% spray or 1·0% dust, was 89% to 100% effective and appeared to act systemically. Parathion 5%, malathion 10% and heptachlor 2½% granules gave even better control and, in limited tests, did not leave excessive residues when applied one week before harvest.

Tomatoes and other Solanaceae.

(*See also* 3241, 3247, 3248, 3312, 3636, 3641, 3676, 3686, 3795c, d, g, l, o, q, z, 3796e, p, s, u, v, x, 3910.)

3740. Carncross, J. W. (Editor).
American tomato yearbook, 1958.
C. Stedman Macfarland, Jr, 8 Elm St., Westfield, New Jersey, 1958, pp. 40, sub-price $2.

This yearbook might best be described as a directory to the tomato industry of North America, providing many facts and figures which should be of use to growers and processors in the U.S. and Canada. Among items of general interest are the names and addresses of individuals conducting research on tomatoes in the U.S. and Canada, lists of useful booklets, pamphlets and periodicals and of recent articles on tomatoes, and details of the grade requirements of tomatoes for canning and processing.

3741. Folley, R. R. W., and Dorling, M. J.
Tomato growing on small nurseries.
[*Mimeo. Rep.*] *Dep. agric. Econ.*, *Wye Coll.*, 1958, pp. 33, 2s. 6d.

The report is a short-term study, carried out with the assistance of the Tomato and Cucumber Marketing Board, on costs of production, profit levels and alternative glasshouse crops, covering the cropping years 1955 and 1956.

3742. Ragazzi, G.
La coltura del pomodoro in Italia. I. Origine, caratteri botanici, inquadramento-economico. II. Le cultivar principali e la produzione delle sementi. III. La tecnica colturale. (**Tomato growing in Italy. I. Origin, botany and place in national economy. II. The chief varieties and seed production. III. Cultural technique.**)
Riv. Ortoflorofruttic. ital., 1958, **42**: 7-20, 127-48, 257-71, illus.

Part I shows the great importance of the tomato in Italy. Part II gives descriptions of tomato varieties suitable for table, storage, processing or combinations of these purposes, followed by an account of the preparation and testing of seed and of methods of breeding and selection. Part III discusses rotations, mixed cropping with peas or onions, tillage, manuring, sowing, transplanting, earthing up, removal of side shoots, staking and irrigation. In some areas the seeds are sown in the field in November or December and the seedlings are protected by tiles or *Opuntia* "leaves" stuck slanting into the soil, or by straw propped against horizontal canes. Reeds (*Arundo donax*) are frequently grown for staking tomato plants.

3743. Awdejew, J. T., Rudas, A. P., and Klapij, R. P.
Wirksame Methode des Anbaues neuer Tomatensorten. (**An effective method of producing new tomato varieties.**)
Schweiz. Gärtnerztg, 1958, **61** (25): 1-2, illus.

Russian experience with grafting tomato varieties on *Verbena officinalis* stocks is described. The vegetative hybrids flowered and ripened earlier, and produced more and heavier fruits than non-grafted plants.

3744. King, L. J.
Growth responses of a *Cyphomandra-Lycopersicon* graft.
Contr. Boyce Thompson Inst., 1958, **19**: 375-8, bibl. 7, illus.

Tomato scions were cleft grafted onto 1-month-old seedlings of tree tomato. Only 1 graft out of 6 survived, and this grew very slowly. In the winter the scion was cut back and eventually died, and a new "callus shoot" was produced from the graft callus. The callus cells appeared to have developed entirely from tomato tissue. Within a year the callus shoot reached a height of 30 inches. Root initials emerged along two-thirds of its length, the leaves showed epinasty and curling and nodes were swollen. Fruit set was poor; during the winter flower clusters abscissed, while in the spring those on the primary axis of the callus shoot set fruit which remained small and green. Laterals near the top of the callus (i.e. farther from the stock) produced larger fruit which ripened, and a single pointed tricarpellate fruit. It is suggested that growth substances produced in the foliage of the stock may affect the growth of the scion.

3745. Taran, L. D.
Interspecific hybridization of tomatoes in the presence of pollen of the maternal flower. [Russian.]
Doklady vsesojuz. Akad. seljsk Nauk, 1958, **23** (5): 16-19.

Emasculated and intact buds of 2 tomato varieties were cross-pollinated with *Lycopersicum hirsutum*. Fruit set of the intact buds was 8–10 times higher and the number of seeds in the fruit 5–6 times greater than that of the emasculated buds. Hybrid seedlings raised from the emasculated flowers were practically sterile, though some fruit set was obtained under 10-hr day conditions. Among F_2 hybrids raised from the intact flowers there were a few individuals with valuable characteristics, including firm fruit of good keeping quality.

3746. Kurtz, E. B., Jr., and Liverman, J. L.
Some effects of temperature on pollen characters.
Bull. Torrey bot. Cl., 1958, **85**: 136-8, bibl. 10.

The effect of temperature on pollen size and exine characters of tomato and cocklebur was studied under controlled conditions. Day and night temperatures had little effect on exine characters, but diameter of pollen decreased at high and low night temperatures and at high day temperatures. [Authors' summary.]—Univ. Ariz., Tucson, and Texas A. and M. Coll., College Station.

3747. Hunter, A. W. S.
The effect of moisture content on the sensitivity of tomato seeds to X-rays.
From abstr. in *Agric. Inst. Rev.*, 1958, **13** (3): 37.

Seeds of the tomato variety New Hampshire Cherry were stored for 18 days at 5 different relative humidities that gave moisture contents in the seeds ranging from 1·0 to 16·2%. Seeds of each moisture content were exposed to X-ray dosages of 2,000r, 4,000r, 6,000r, 8,000r. and 10,000r. Obvious radiation effects were shown only by the seedlings grown from the driest seed (1·0% moisture). The only effect in all other treatments was a very few plants with a very few chlorotic spots. In the dry seeds increased X-ray dosage lengthened the time to germinate from 10 days for the controls to 17 days for those receiving 10,000r. The relationship between days to germinate and dosage was linear. Irradiation at 2,000r and 4,000r had little effect on seedling viability. At 6,000r only 7·7% of the seedlings survived, and at higher dose rates none survived.—Canada Dep. Agric., Ottawa.

3748. Kušnirenko, S. V.
Physiological characteristics of tomato and maize plants hardened by alternating temperatures. [Russian, with English summary ¼ p.]
Fiziol. Rast., 1958, **5**: 235-44, bibl. 31.

In the northern Trans-Urals where diurnal variations in the temperature are great, hardening the seed of warm-loving plants improves their hardiness. Tomato plants, raised from seed soaked for 12 hrs and then subjected to alternating cold and warm treatment (12 hrs at −1° C., 12 hrs at 18° C.) for 5 to 37 days, showed increased photosynthetic and respiratory activities resulting in improved hardiness and increased yields.

3749. Smartt, J.
A note on processing tomato seed for storage.
Rhod. agric. J., 1958, **55**: 314, bibl. 1.

A method is described for removing the mucilaginous envelope which encloses tomato seeds and causes them to stick together on drying. Seeds and juice from over-ripe fruit are squeezed into a flat uncovered dish to ferment for about 3 days, the time depending on temperature and on variety. When the mucilage is decomposed, the seeds are washed, drained, and dried in the air on blotting paper. The white scum which forms on the surface of the liquid during fermentation is transferred to subsequent batches to accelerate the initial stages of the process.

3750. Davies, J. N.
Chromatographic examination of some constituents of tomato fruit, with particular reference to the carbohydrates.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, p. 65, bibl. 5.

The study of carbohydrates in tomato fruits is in progress. A preliminary chromatographic examination of the organic acids present in 80% ethyl alcohol extracts has shown the presence of citric and malic acids, together with traces of two other acids as yet unidentified.

3751. Rios, E. de C.
Chemical composition of some varieties of tomato.
An. Asoc. brasil. Quim., 1957, **13**: 5-13, bibl. 14, from abstr. in *J. Sci. Food Agric.*, 1958, **9**: i-275-6.

Results of analyses for water, protein, ash, fat, fibre, glucose, non-nitrogenous matter and calorific values are given for (*a*) the same tomato variety on different soils, and (*b*) different varieties on the same soil. Succulent varieties had higher calorific values and were richer in ascorbic acid, glucose and carotenoid pigments than non-succulent varieties. Santa Cruz was richest in seed oil, followed by Garrafinha. Comparison of the oils from succulent and non-succulent varieties showed that the main difference lies in the acid number, and that both are semi-drying oils.

3752. Massey, D. M., and Winsor, G. W.
The composition of tomato fruit in relation to variety, state of ripeness and fruit quality.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 52-64, bibl. 2.

"The general conclusion to be drawn from these and similar sets of data is that the content of total solids, sugars, nitrogenous compounds and acids in the expressed sap, already shown to be lower in blotchy than in normal fruit [*H.A.*, 26: 3840 and 28: 489] is even lower in 'waxy' fruit." Suggestions are made for the simplification of analytical methods.

3753. Spencer, M. S.
Ethylene metabolism in tomato fruit. II. Determination of total and C^{14}-labelled ethylene.
Canad. J. Biochem. Phys., 1958, **36**: 595-601, bibl. 11.

A method has been developed for the determination of the radioactivity from C^{14}-labelled ethylene absorbed in aqueous mercuric perchlorate-ethylene glycol. Counting was done on a liquid sample in a gas flow counter. This procedure was designed for the analysis of C^{14}-labelled ethylene evolved by fruit to which possible ethylene precursors had been administered. Total ethylene could be measured manometrically on the same sample. The manometric procedure permitted analysis for ethylene in quantities evolved by one or two tomatoes or other fruit. [Author's abstract.]—Univ. Alberta, Edmonton.

3754. Leonard, E. R., and Head, G. C.
Technique and preliminary observations on growth of the roots of glasshouse tomatoes in relation to that of the tops.
J. hort. Sci., 1958, **33**: 171-85, bibl. 9.

The use of glass-sided boxes and trenches for observing the growth of the roots of glasshouse tomatoes has been investigated. Marked seasonal trends have been found with 2 varieties in 2 years. There was a rise to a peak followed by a rapid fall in total root length, due to death and disappearance of the roots, with a subsequent recovery. This trend occurred in all horizons of soil. Growth of the stem and leaves was relatively steady from planting-out (March) until mid-May, when there was a slight decrease with subsequent recovery until the main stem and laterals were "stopped" in July. The number of flowers per truss was high in the bottom 5 or 6 trusses, in which fruit set was high, fell in the median trusses which had low set, and rose in the uppermost trusses accompanied by increased set. The resulting production of fruit weight was high in the bottom trusses and low in the top. The peak of root length development coincided with the swelling of the fruit in the bottom trusses; a trough occurred when the number of flowers per truss and the number set were low, and root length recovered when the first trusses were picked. [Authors' synopsis; see also *H.A.*, 26: 3821.]—Exp. Res. Stat., Cheshunt, Herts.

3755. Somos, A.
Állománysűrűségi vizsgálatok eredményei az üveg alatt hajtatott paradicsomnál. **(Results of spacing trials with tomatoes grown under glass.)** [Russian and German summaries 1½ pp. each.]
Kert. szől. Főisk. Évk., 1957, **21** (5 part 1): 3-14 [received 1958].

In hot beds the optimum spacing, in respect of yield and profits, proved to be 600–800 sq. cm. per plant (25–30 plants per frame), and in glasshouses 750 sq. cm. per plant (30×25 cm.). These close spacings had no appreciable effect on the average weight of individual fruits nor on the time of ripening.

3756. Cooper, A. J.
1956 observations on the effect of the retention of selected axillary shoots on the cropping of the Potentate variety of tomato.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 33-9, bibl. 2.

The retention of all axillary shoots below the first inflorescence on the main stem of tomatoes and the removal of all others led to an almost threefold increase in total yield compared with plants on which all axillary shoots had been removed. However, the former treatment resulted in a decrease in early yield for the first 4–5 weeks of picking.

3757. Cselőtei, L.
Hormonpermetezés hatása a paradicsom termésérésére. **(The effect of a growth substance on the ripening of tomatoes.)** [English, Russian and German summaries ¾ p. each.]
Növénytermelés, 1957, **6**: 331-44, bibl. 17.

In a 3-year experiment spraying tomatoes with 1% Tomafix increased early yields, fruit size and dry matter content and induced parthenocarpy. Growing tomato plants by the 1- and 2-stem method also improved fruit size and early yields, but depressed dry matter contents and total yields below those of the control [unpruned?].

3758. Ramshorn, K.
Über Wirkungen von 2,4-Dichlorophenoxyessigsäure auf Gestalt und Ertrag von *Lycopersicon esculentum* Mill. "Lukullus". **(The effect of 2,4-D on the form and yield of *Lycopersicon esculentum* Mill. variety Lukullus.)**
Kulturpflanze, 1956, **4**: 296-314, bibl. 38, illus.

Soaked tomato seeds, and plants before the bud stage, at the first bud stage and at fruiting were treated with aqueous 2,4-D ($0{\cdot}5\times10^{-3}$ to $0{\cdot}5\times10^{-9}$ g./ml.). The effect of these treatments on the growth and morphology of the plants and fruits is described. Seed treatment at all concentrations reduced yields, but only the highest two by over 5%. At the pre-bud stage the two highest rates caused a marked reduction in yield and the other rates a slight increase. At the first bud stage the highest rate caused a decrease in yield while the other rates had little effect. Seeds from affected fruits produced abnormal plants, the progeny of which, however, was normal.—From *Weed Abstr.*, **7**, No. 1000.

3759. Plummer, T. H., and Tomes, M. L.
Effects of indoleacetic acid and gibberellic acid on normal and dwarf tomatoes.
Bot. Gaz., 1958, **119**: 197-200, bibl. 11.

Four normal tomato varieties and four dwarf strains homozygous for the genetic factor *dd* were studied. Indoleacetic acid (IAA) applied to the foliage of young plants gave no significant growth stimulation of either the normal or the dwarf type. When IAA was supplied to etiolated hypocotyl segments in straight growth tests, the only differential response was the greater sensitivity of one of the dwarf types. This sensitivity was not associated with the *d* locus. Dwarf plants treated with gibberellic acid (GA) exceeded in height the untreated normal plants, but significant increases in growth occurred in all varieties treated, regardless of genotype. Two varieties, one dwarf and one normal, showed a significant sensitivity to GA at low concentrations which failed to stimulate the other varieties studied. Light intensity was found to influence both the normal and the dwarf types similarly. In temperature studies the dwarf varieties appeared to be less responsive to temperature increases. [Authors' summary.]—Purdue Univ., Lafayette, Ind.

3760. Neal, O. M., Jr.
The effect of soil moisture and a transpiration reducing spray on transpiration and growth.
Diss. Abstr., 1958, **18**: 18, being *Publ.* 24,252 of 70 pp.

There was less reduction due to low soil moisture conditions in the rate of transpiration relative to the controls when conditions were not conducive to rapid transpiration. Reduction in transpiration rates was greater in the afternoon than in the morning. Transpiration of tomato in compost soil was reduced with the first reduction in available water, while in sand transpiration was not reduced until over 80% of available soil moisture had been removed. Clay and muck soils were intermediate and gave a gradual reduction in transpiration rate of tomato, starting when 40–50% of the available moisture was exhausted. Transpiration-reducing sprays were found to reduce transpiration by about 10% for each percentage of oil they contained, and growth was proportionately reduced.—Mich. St. Univ.

3761. Lekve, O.
Staubewässerung im Frühbeet. **(Sub-irrigation in forcing frames.)**
Dtsch. Gartenb., 1958, **5**: 147-9, bibl. 2, illus.

Sub-irrigation maintained at 1·5 cm. below the gravel surface has given improved vegetative and reproductive growth of tomato seedlings and *Capsicum* and cyclamen plants in pots. After transplanting, tomato plants raised with sub-irrigation yielded 29% more fruit than plants raised with hose watering. Labour costs were reduced by the use of sub-irrigation.—Inst. Gemüseb., Grossbeeren.

3762. Heeney, H. B., Cutliffe, J. A., and Rutherford, W. M.
An evaluation of methods of estimating irrigation requirements of the tomato canning crop.
From abstr. in *Agric. Inst. Rev.*, 1957, **12** (3): 39.

In 3 years' trials at the Smithfield Substation various methods were used to determine when to irrigate and how much water to apply to the tomato canning crop. In these trials a "Rule-of-Thumb" procedure of applying irrigation water was compared with a method using electrical resistance to measure soil moisture and with one or more procedures using meteorological data. To date the electrical resistance procedure has proved to be the simplest to apply, although the use of the Bellani plate atmometer shows considerable promise. The method of application of the results of the atmometer readings to the irrigation of the tomato crop is shown, and soil moisture deficits by this procedure and the electrical resistance procedure are compared. The effect of the various methods of estimating irrigation requirements on the yield of the tomato over the 3-year period is presented.—Canada Dep. Agric., Ottawa, and Ont. Dep. Agric., Ottawa.

3763. Jenkins, J. M., Jr.
Cool or warm plants with irrigation.
Res. and Fmg N.C., 1958, **16** (4): 15, illus.

Tomatoes were successfully protected from frost by overhead irrigation during calm weather, and when temperatures were not more than 2–3° F. below freezing. "Burning" of gladiolus flower buds was prevented by using overhead irrigation in the middle of the day; the irrigated plants were 6° F. cooler than the non-irrigated plants.

3764. Chipman, E. W.
Mulches on ridged and flat rows for tomatoes.
From abstr. in *Agric. Inst. Rev.*, 1958, **13** (3): 39.

In a 2-year trial black plastic and sawdust mulches were compared for tomatoes grown on ridges and on the flat. The highest soil temperature and lowest soil moisture readings were obtained on the plastic-covered plots, the sawdust plots having low temperature and high moisture readings. Early yields were highest on the sawdust plots, but total yields were highest on the plastic plots, which also produced more unmarketable small fruits. Plants grown on the flat produced a larger early crop, but those on ridges produced a larger total crop and more unmarketable fruit.—Canada Dep. Agric., Kentville.

3765. Doyle, J. J., and MacLean, A. A.
Effect of soil aggregate size on diffusion of oxygen and on plant growth.
From abstr. in *Agric. Inst. Rev.*, 1957, **12** (3): 43.

Yields of tomato plants increased with soil aggregate size and with diffusion rate of oxygen. Under the test conditions, optimum diffusion rates of oxygen for tomato at depths of 2, 4 and 6 in. were 26×10^{-7} 13×10^{-7} and 9×10^{-7} g./sq. cm./min. respectively.—Canada Dep. Agric., Fredericton, N.B.

3766. Giles, J. E.
Effect of Krilium as a soil improver for glasshouse tomatoes.
J. Aust. Inst. agric. Sci., 1958, **24**: 160-2.

Four trials were carried out which showed that the addition of Krilium to a loam or clay glasshouse soil had no effect on the yield, earliness of ripening or average fruit weight of the tomato crop grown on those soils.—C.S.I.R.O., Merbein, Vict. J.R.L.

3767. Plant Protection Ltd.
Alternative to formaldehyde for glasshouse soils.
Comm. Gr, 1958, No. 3564, p. 171, illus.

Glasshouse trials have shown that Sistan [composition not given] effectively controls soil-borne diseases and eelworms, with good pre-emergence control of weeds. Tomato yields were 10% higher after Sistan than with other methods of chemical sterilization. Costs of treatment are about £175 per acre.

3768. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med forskellige jordbehandlinger og gødninger til tomater i vaeksthus 1953-56. **(Trials with various soil treatments and manures for glasshouse tomatoes 1953-56.)**
Tidsskr. Planteavl, 1958, **62**: 365-8.

Two experimental plots (a sandy soil in a cold house and a clay soil in a heated house) were given treatments of chloropicrin fumigation or soil steaming, each with organic or artificial manuring, and the effect on tomato yield and quality was observed. In general treatment every year gave better results than treatment every other year, but differences between chloropicrin and steam sterilization were small. Results from applications of organic manures were better than those from application of artificials. On the clay soil all the treatments were profitable, except steam sterilization to a depth of 25 cm. The most economic treatment was steaming to 50 cm. or chloropicrin every other year plus organic manuring. On the sandy soil chloropicrin plus artificials had an injurious effect; steaming to 25 cm. plus artificials had no effect. The best treatment was steaming to 50 cm. every year plus artificials, but steam every other year plus organics is recommended as being more economic.

3769. Štrausberg, D. V.
The influence of temperature on the assimilation of nutrients by plants in the polar regions. [Russian, with English summary ½ p.]
Fiziol. Rast., 1958, **5**: 228-34, bibl. 6.

A series of experiments was conducted on tomato, maize, oat, cabbage and rye plants grown in soil and water cultures using P^{32}, Ca^{45}, S^{35}, N, K and $C^{14}O_2$. P uptake from root application was reduced to a greater extent by low soil temperatures than by low air temperatures, the reverse being true with foliar application. In general, under conditions of root nutrition a reduction of the temperature to 11–12° C. reduced the uptake of P but not of N, a further drop to 7° C. decreased N uptake with little further effect on P, and at 5–7° C. the N uptake was reduced drastically, P somewhat less and Ca and S the least. Low soil temperatures scarcely affected K uptake. In tomato plants a fall to 11° C. slightly reduced N uptake without affecting protein synthesis, but it increased the protein N: non-protein N ratio. At these lower temperatures the nitrate N content of the sap increased considerably; there was no sap exudation and the translocation of C^{14} labelled assimilates was slowed down.

3770. Winsor, G. W., and Davies, J. N.
The composition of tomato foliage from blocks B and C during 1955, and its relation to crop yields.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 66-9, bibl. 2.

Five out of 8 houses showed significantly positive correlations between crop yield and potash content, generally accompanied by significant negative correlations between yield and phosphate content. Of the remaining 3 houses, 2 showed no significant correlation between yield and tissue analyses whatsoever, whilst one gave the only significant positive correlation with phosphate content encountered during 1955. [From authors' conclusions.]

3771. Heeney, H. B., and Ward, G. M.
The relation of nutrient content to the yield of the canning tomato.
From abstr. in *Agric. Inst. Rev.*, 1957, **12** (3): 39.

As part of a fertility study conducted in commercial canning tomato fields, the relation of the P and K contents of the tomato foliage to the yield of fruit was studied over a 2-year period. The tissue sampled for analysis consisted of the leaf blade of the first fully expanded leaf from the apex of the plant 6 weeks after transplanting. For maximum yield of fruit, levels of 0·35–0·40% of total P and at least 3·5% of total K are required.

3772. Long, M. I. E., and Winsor, G. W.
Urea-formaldehyde compounds as nitrogenous fertilizers.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 70-6, bibl. 10.

Of the 5 urea-formaldehyde compounds tested as nitrogenous fertilizers for tomato plants, 1 proved to be too rapidly and 3 too slowly available for plant growth. The remaining sample, of the methylene-urea type, showed promise as a slow-acting fertilizer. [From authors' summary.]

3773. FULLER, W. H., AND HANNAPEL, R.
The influence of nitrogen on the uptake of phosphorus by a tomato test crop from three crop residues.
Soil Sci., 1958, **22**: 299-302, bibl. 7.

The uptake of P from wheat straw, tomato vine and lettuce residues by a tomato test crop as influenced by different rates of N additions was studied under greenhouse conditions. The percentage of P in the test crop derived from the crop residues was not affected by N additions either in a soil deficient in plant-available P or one adequately supplied with indigenous available P. However, the total uptake of plant residue P by the test crop was significantly influenced by the concentration of P in the residue. [From authors' abstract.]—Ariz. agric. Exp. Stat.

3774. HALSTEAD, R. L., AND HEENEY, H. B.
Exchangeable potassium and per cent potassium saturation of soils in relation to tomato yield.
From abstr. in *Agric. Inst. Rev.*, 1958, **13** (3): 43.

In 31 field trials on soils varying from sandy loam to clay loam in Prince Edward County exchangeable K values were not correlated with response to K fertilizer by tomatoes. Exchangeable K as a percentage of the exchange capacity showed some correlation with yield response to K. The relatively low correlation coefficient (0·34) approached significance at P 0·05. In this area where the use of fertilizer has influenced the K levels of the soil there was evidence of a better relationship between exchangeable K and yield within groups of soils possessing similar texture. Water-soluble K was significantly correlated with the percentage saturation of exchangeable K, and over the range of textures encountered was a better criterion of crop response than was exchangeable K.—Canada Dep. Agric., Ottawa.

3775. BOVAY, E.
Carence en bore et dégâts provoqués aux cultures par des applications excessives d'engrais boriqués. (**Boron deficiency and damage to crops after excess B applications.**)
Rev. romande Agric. Vitic., 1958, **14**: 53-5, illus.

In pot tests tomato plants showed symptoms of B toxicity when applications reached 500 mg. per pot. High B applications caused higher plant contents of N, P, K, Mn, Na and B, while Ca and Mg contents were unaffected.

3776. STEPHENS, S. E.
If your tomatoes lack magnesium.
Qd agric. J., 1958, **84**: 225-7, illus.

Deficiency symptoms are described. Shortage of Mg may be avoided by applying dolomite at 1 ton/acre or magnesium sulphate at 56 lb./acre every second or third year. Plants showing deficiency symptoms may be sprayed with a 2% solution of magnesium sulphate.

3777. JOHNSTON, D. A.
Winter tomato production.
J. agric. W. Aust., 1958, **7**: 259-63, bibl. 1, illus.

Recent research on quality of winter tomatoes grown in W. Australia for Melbourne and Singapore markets showed the chief sources of poor quality to be prolonged exposure to temperatures below 60° F., mechanical injury, mineral deficiencies particularly K, early blight (black spot) disease, and incorrect fruit maturity at picking.

3778. RUZINOV, P. G., AND ŠČUPAK, K. D.
A wilt of tomato leaves in Moldavia. [Russian.]
Tr. Mold. Ovošč-Kartof. orosit. opyt. St., Kishinev, Gosizdat Moldavii, 1956, pp. 327-36, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 78,119.

A premature wilting of tomato leaves, affecting mainly early varieties and seedlings planted out early, causes serious losses in Moldavia. The symptoms differ from those caused by *Fusarium*. Irrigation and fertilization, especially with N, reduced incidence of the wilt. Sharp fluctuations in the temperature during fruit set enhanced the attack. N and P deficiency during fruit set caused wilt in plants with fruits but had no effect on plants from which the fruits had been removed. It is suggested that the cause of wilt is nutrient and water transfer from the leaves to the fruits.

3779. CLOSS, R. L.
Cloud or blotchy ripening in tomatoes.
Fruit and Prod., 1958, April, p. 3.

Controlled environment experiments showed that low light intensities 1 or 2 weeks prior to ripening caused blotchy ripening. The condition was associated with reduced sugar content.—D.S.I.R., Lower Hutt, N.Z.

3780. JOHNSTON, D. A.
Tomato fruit quality. The effect of mechanical injury.
J. Agric. W. Aust., 1958, **7**: 337-8, bibl. 1.

Secondary infection after mechanical injury to harvested tomatoes is mainly by *Alternaria* sp., which can be reduced by zineb sprays in the field. Suggestions are made for the reduction of mechanical damage during handling.

3781. LEONE, G.
L'impiego degli acuprici in Campania con particolare riferimento a un biennio di prove sul pomodoro nella Piana del Sele (Salerno). (**The use of non-copper fungicides in Campania, with special reference to two years' tests on tomatoes in the Plain of Sele, Salerno.**)
Not. Mal. Piante, 1958, Nos 43/44, pp. 210-18, bibl. 1.

Zineb at 0·3% was completely effective in preventing attacks of early and late blight on tomatoes, while 1% bordeaux not only failed to control early blight, but checked growth and made the plants unnaturally rigid. In the first year fruit quality was improved by zineb, but not in the second, which was a poor cropping season. In both years the zineb-treated plots gave the highest yields, the mean being 433·6 quintals (1 qu. = 100 kg.) per ha. compared with 418·9 for bordeaux and 281 without treatment.

3782. PICCO, D.
Preparati cuprici ed acuprici nella lotta contro le più comuni crittogame parassitarie del pomodoro. **(Copper and non-copper fungicides for control of the more common fungus diseases of tomato.)** [English summary ⅓ p.]
Not. Mal. Piante, 1958, Nos 43/44, pp. 189-209.

There were slight, but not significant, differences in efficiency of the fungicides tested against *Septoria lycopersici* on tomatoes, the descending order being: copper-calcium oxychloride, ziram, zineb, captan. Against *Phytophthora infestans* zineb, particularly when mixed with colloidal sulphur, gave the best results.

3783. GHILLINI, C. A.
Acuprico polivalente contro le crittogame del pomodoro. **(A non-copper fungicide for control of several tomato diseases.)**
Not. Mal. Piante, 1958, Nos 43/44, pp. 219-24.

A ziram-sulphur product sprayed 3 times at 0·3%, 0·4% or 0·5% gave better control of late blight, leaf spot and *Alternaria* sp. on tomatoes than a 0·8% copper-calcium fungicide followed by 1% copper sulphate. Slight toxicity symptoms developed at the highest concentration of the non-copper fungicide, but the copper treatment checked growth and damaged the leaves.

3784. CHAVES, G. M., AND COUTO, F. A. A.
Ensaios comparativos sôbre a eficiência de fungicidas orgânicos e à base de cobre no contrôle da mela (*Phytophthora infestans* (Mont.) de Bary) e da septoriose (*Septoria lycopersici* Speg.) do tomateiro. **(Comparative trials on the efficiency of organic and copper fungicides for control of late blight (*Phytophthora infestans*) and leaf spot (*Septoria lycopersici*) of tomato plants.)** [English summary 1 p.]
Rev. Ceres, 1958, **10**: 303-16, bibl. 19.

Manzate at 0·25% was more effective than dithane Z-78, phygon, ferbam or copper fungicides in controlling both late blight and leaf spot of tomatoes in wet and dry seasons. Late blight in dry weather was satisfactorily controlled by copper oxychloride at 0·5%, or by alternating this with manzate.

3785. LEBLOND, D.
Application de fongicides sur les tomates. **(The use of fungicides on tomatoes.)**
Rep. Que. Soc. Prot. Plants, 1957, 1958, **39**: 52-4.

In two years' trials 7 fungicides were tested against *Phytophthora infestans*, *Phoma destructiva* and *Botrytis cinerea*, of which the first was the most important disease. The best results were obtained from captan 50%, 3 lb. in 100 gal. [See also *H.A.*, 27: 2541.]

3786. WILLIAMS, P. H., AND HACK, J.
Didymella stem rot of the tomato.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 110-12, bibl. 3.

In laboratory experiments certain soil organisms, probably bacteria and actinomycetes, proved toxic to spores of *Didymella lycopersici* in the soil, while sterilized soil did not inhibit spore germination. [See also *H.A.*, 27: 3591.]

3787. BUTLER, E. E.
Relation of the vinegar fly to watery rot of tomato fruit.
Proc. 12th annu. Res. Conf. Calif. Fig Inst., 1958, pp. 23-4.

Drosophila melanogaster collected from peach orchards and other sources were examined, and up to 50% of the flies were found to be carrying spores of *Oospora lactis*, the fungus causing watery rot of tomato. It was demonstrated in the laboratory and in the field that injured tomato fruit kept free of flies remained healthy, whereas the disease soon developed in injured fruit visited by vinegar flies. It is considered that once watery rot is established in a field its spread depends not only on conditions which cause fruit injury but also on the vinegar fly population. J.R.L.

3788. WENE, G. P.
Notes on the control of the tropical mite attacking tomatoes.
J. Rio Grande Valley hort. Soc., 1958, **12**: 99-101, bibl. 2.

In one trial, in which 5 acaricides were compared as dusts, good control of *Tetranychus marianae* was obtained with 4% trithion; and in another, in which 4 compounds were compared as high volume sprays, chlorobenzilate and diazinon, both at 0·5 lb./100 gal., were effective.—Tex. agric. Exp. Stat., Weslaco.

3789. SIMON F., J. E., YAGA, R., AND ARELLANO, M.
Estudios con el insecticida experimental Shell W.L.1650 en maiz y tomatera. **(Studies with the experimental insecticide Shell W.L.1650 on maize and tomato plants.)**
Inf. mens. La Molina, 1958, **32** (367): 7-16.

The insecticide is a chlorinated hydrocarbon. Its action against aphids and *Gnorimoschema absoluta* on tomato plants was similar to that of endrin, and for satisfactory control on a heavily infested area it was necessary to apply 447 g. of the technical preparation per ha. at weekly intervals.

3790. WENE, G. P.
TDE residues on tomatoes and spinach.
J. Rio Grande Valley hort. Soc., 1958, **12**: 104-5.

The tolerance level for TDE [DDD] in the U.S.A. is 7 p.p.m. The residue found on unwashed tomatoes 2 days after dusting with 5% TDE at 26 lb. was only 0·63 p.p.m. By contrast, residues found on spinach 3 days after dusting or spraying exceeded 100 p.p.m., but by the 5th day they had dropped to 15–16 p.p.m. and by the 7th day they were slightly below 7 p.p.m.—Tex. agric. Exp. Stat., Weslaco.

3791. BOGATOV, V. M.
The effect of low temperatures on eggplants. [Russian.]
Fiziol. Rast., 1958, **5**: 356-8, bibl. 9.

Three experiments are described involving (1) alternating cold and warm treatment of seeds (5° or 10° and 25° C.); (2) growing plants, from sowing, in the glasshouse and then outdoors and the reverse; and (3) growing plants from sowing first at low soil (10° C.) and high air temperature (18–22° C.) and then at 18–22° C. soil and air temperature and the reverse. The results showed that a short period of low temperature treatment of the germinating seeds of eggplants followed by high temperatures stimulated development and increased yields.

3792. OBERMAYER, E.
A fűszerpaprika legjobb ültetési idejének megállapítása, szakaszos ültetési idő kísérletekkel. (**Determination of the optimum planting time for paprika by periodical planting trials.**)
Magyar tud. Akad. agrártud. Oszt. Közl., 1955, No. 3-4, pp. 279-305, from *Hung. agric. Rev.*, 1957, Vol. **6**, Abstr. 19.

In normal seasons early to mid-May was the optimum time for planting paprika. Earlier planting was more successful in a dry year, and planting from late May to early June is recommended in damp and cool seasons.

3793. TROFIMOV, M. V.
Foliar nutrition with trace elements. [Russian.]
Sad i Ogorod, 1958, No. 6, pp. 32-3.

Soaking pepper and eggplant seeds in 0·05% copper sulphate for 6 hours improved germination. For foliar nutrition 0·05% concentration of trace elements applied at the time of bud formation proved to be the most effective. Pepper sprayed with Cu gave a yield of 152 centners/ha., with Co 147 ct., Mn 124 ct., B 130 ct. and the control 102 ct. Corresponding figures for eggplant were 240, 242, 200, 204 and 175 ct./ha. The treated crops matured earlier and contained more vitamin C. The vitamin C content of technically mature fresh fruits of pepper sprayed with Cu was 136·6 mg.%, Co 177·2, Mn 192·3, B 176·4 and the control 131·1; that of eggplant 4·1, 5·3, 5·7, 5·0 and 4·0 mg.% respectively.

3794. CHANDLER, W. A.
Control of bacterial spot and ripe rot of pimiento pepper.
Plant Dis. Reptr, 1958, **42**: 652-5, bibl. 2.

Spraying pimiento peppers with a mixture of streptomycin and basic copper sulphate provided best overall control of bacterial spot (*Xanthomonas vesicatoria*) and ripe rot (*Vermicularia capsici*). Control of bacterial spot was also obtained with tri-basic copper sulphate alone or with Dyrene (2,4-dichloro-6-(*o*-chloranilino)-*s*-triazine). Mixtures of streptomycin with maneb or thiram controlled bacterial spot, but Phaltan (N-trichloromethylthiophthalimide) plus streptomycin was ineffective against both bacterial spot and ripe rot. Chlorosis and reduced yields were produced by Dyrene and by a mixture of streptomycin and thiram.—Ga Exp. Stat., Experiment.

Noted.

3795.

a AULTMAN, D. A.
Lettuce varieties for Mississippi.
Miss. Fm Res., 1957, **20** (10): 7-8.
Tests of strains of var. Great Lakes and advice on growing the crop.

b BALLARD, J. C., AND DEZEEUW, D. J.
Spartan Rock—a new Fusarium wilt resistant muskmelon.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 822-4, bibl. 1, illus.
Early, high yielding but rather small.

c BERKELEY, G. H., AND RICHARDSON, J. K.
Tomato diseases.
Publ. Canada Dep. Agric. **759**, revised 1957, pp. 26, illus.
A pamphlet for growers containing descriptions and control measures.

d BOTTINI, E.
Sull'efficacia concimante dei fosfati micropolverizzati. (**The fertilizing effectiveness of finely powdered phosphates.**) [English summary 6 lines.]
Ann. Sper. agrar., 1958, **12**: 503-24, bibl. 15.
Several types compared for peas and tomatoes on acid, neutral and alkaline soils.

e BRENNA, H. K.
Sortsforsøk med sukkerert 1953-1955. (**Variety trials with sugar peas, 1953-1955.**) [English summary 7 lines.]
Forskn. Landbruk., 1958, **9**: 233-43, bibl. 20, illus.

f CONEV, D. T.
An investigation on the content of the most important amino acids in seeds of *Phaseolus vulgaris*. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **120**: 368-71, bibl. 6, illus.
The content of certain amino acids in the total protein of bean seeds. [Russian, with German summary 7 lines.]
C.R. Acad. bulg. Sci., 1958, **11**: 105-8, bibl. 8, illus.

g COOPER, A. J.
Blotchy ripening and allied disorders of the tomato: a critical review of the literature.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 39-47, bibl. 66.

h COSTA, A. S., AND DUFFUS, J. E.
Observations on lettuce mosaic in California.
Plant Dis. Reptr, 1958, **42**: 583-6, bibl. 8.
Many hitherto unreported weed hosts, prevalent in the lettuce-growing areas, may act as virus sources.

i DADD, C. V. T.
The pea crop—a review.
Agric. Rev. Lond., 1958, **4** (3): 24-30.
Production figures for various types in the U.K. and cultural practices.

j Ditman, L. P., and Wiley, R. C.
The effectiveness of several insecticides for control of insects on snap beans.
J. econ. Ent., 1958, **51**: 258-9.
No very striking difference between 9 compounds applied against *Empoasca fabae* and *Epilachna varivestis.*

k Dodillet, H.-J., and Sommerfeldt, K.
Kritische Betrachtung über das Wanderlicht. **(Critical consideration of mobile illumination.)**
Gartenwelt, 1958, **58**: 182-4, illus.
The authors consider that the improved growth of vegetable crops obtained by mobile illumination [see *H.A.*, 28: 1371] is not sufficient to justify the extra cost.

l Doyle, W. P., and Wang, C. H.
Glucose catabolism in pepper fruit (*Capsicum frutescens longum*).
Canad. J. Bot., 1958, **36**: 483-90, bibl. 8, illus.
No significant difference in pathway distribution between green mature and red mature peppers.

m Flegg, P. B.
Some aspects of the casing layer in relation to fruiting of the cultivated mushroom.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 93-105, bibl. 8.
See *H.A.*, 28: 2608.

n Gandy, D. G.
Mushroom diseases.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 120-4, bibl. 2, illus.
Studies on "La France" disease.

o Gilbert, J. C., McGuire, D. C., and Tanaka, J.
Tobacco mosaic virus resistance combined with root knot resistance in new tomato hybrids.
Hawaii Fm Sci., 1958, **6** (4): 7-8, illus.
Little known of their commercial value as yet.

p Green, H. B., and Thomas, W. O.
Control of cabbage insects.
Miss. Fm Res., 1958, **21** (2): 7.
A schedule of recommendations.

q Guillemenet, R.
La grosse punaise verte, ennemie des tomates (*Nezara viridula* L.). **(The green vegetable bug, pest of tomatoes.)**
Terre maroc., 1958, **32**: 142-3.
Life history and habits; control by dusting with 0·8–1% parathion, 1·25% methyl-parathion or 5-10% DDT at 30 kg. per ha.

r Hills, L. D.
[Russian Comfrey.]
[Rep.] Henry Doubleday Res. Ass., Bocking, Braintree, Essex, 1958 [?], pp. 8., illus.
Chiefly concerns the organization of research work on Russian comfrey.

s Hoglund, C. R.
Economics of growing and irrigating pickling cucumbers.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 796-805, bibl. 4, illus.

t Hurndell, L. C., and Smith, H. C.
Ringspot disease of lettuce.
N.Z. J. Agric., 1958, **96**: 575-6, illus.
Best control with captan dust or spray and thiram dust [see also *H.A.*, 28: 1493].

u Hussey, N. W.
Mushroom insects.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 125-31, bibl. 4.

v Jackson, A. A.
Timperley Early rhubarb in Kent.
Agriculture, Lond., 1958, **65**: 244-5.
Outstanding for earliness, quality and freedom from bolters.

w Kelly, R. A.
The vegetable canning industry in Illinois.
Bull. Ill. agric. Exp. Stat. **612**, 1957, pp. 44, bibl. 2.
Methods of procurement, types of pack, sales and distribution, contracts with growers.

x Kulp, J. L., and Slakter, R.
Current strontium-90 level in diet in United States.
Science, 1958, **128**: 85-6, bibl. 7.
Including data on the concentration of Sr^{90} in common vegetables from various states.

y Küppers-Sonnenberg, G. A.
Auslese- und Kreuzungszucht an der Topinambur seit dem zweiten Weltkriege. **(Selection and breeding of Jerusalem artichokes since the second world war.)**
Angew. Bot., 1958, **32**: 52-67, bibl. 24.

z Lake, J. V., and Postlethwaite, J. D.
Technique for growing glasshouse tomatoes on a large scale under controlled conditions.
J. agric. Engng Res., 1958, **3**: 163-71, bibl. 12, illus.
Detailed description of methods which produced crops of over 8 tons per $\frac{1}{10}$ acre.

3796.

a Lakon, G., and Bulat, H.
Die Feststellung der Keimfähigkeit der Kompositenfrüchte nach dem topographischen Tetrazolium-Verfahren. **Seed testing of Compositae by the topographic tetrazolium method.)**
Saatgut-Wirtsch., 1955, 7: 201-4, 230-3, 259-61, bibl. 10, illus.
Plants tested include lettuce, endive and scorzonera. [For legumes see *H.A.*, 28: 1081m.]

b LUCHINI, R.
Il pisello per l'industria conserviera argentina. Sgranatura sul campo e insilaggio delle piante per il bestiame. **(Peas for the canning industry in Argentina. Shelling in the field and ensilage of the plants for cattle fodder.)** [English summary 5 lines.]
Riv. Agric. subtrop. trop., 1958, **52**: 223-46, bibl. 8, illus.
Cultural practices, varieties, machinery.

c MASLENIKOV, I. P.
Control of onion nematode. [Russian.]
Sad i Ogorod, 1958, No. 5, pp. 27-8.
By crop rotation, hot water treatment of the seed, ammonium nitrate top dressing or soil treatment with dichloroethane.

d MAYER, A. M.
A reduced diphosphopyridine nucleotide oxidase in lettuce seeds.
Nature, 1958, **182**: 317-18, bibl. 6.

e MESSING, J. H. L., AND WINSOR, G. W.
Boron in the nutrition of tomato plants.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 77-83, bibl. 4.
Little or no beneficial response to added B during 1956.

f MINISTRY OF AGRICULTURE, LONDON.
Winter cabbage and savoys.
Adv. Leafl. Minist. Agric. Lond. **350,** revised 1958, pp. 4.
Varieties and cultivation.

g NAKAGAWA, Y.
Watermelon growing in Hawaii.
Ext. Circ. Univ. Hawaii **386,** 1957, pp. 11, bibl. 6, illus.
Soil preparation and planting, management, disease and pest control.

h NATIONAL INSTITUTE OF AGRICULTURAL BOTANY.
38th Annual Report of the N.I.A.B., 1957, Cambridge, 1958, pp. 56.
Includes notes on the certification and multiplication of vegetables.

i PAISLEY, K.
Vegetables in the open.
Evans Bros. Ltd., London, 1958, pp. 48, illus., 2s. 6d., being *Young Fmrs' Club Booklet* **32.**
Practical aspects.

j PETERSON, C. E., AND RIES, S. K.
The evaluation of pickling cucumber varieties for Michigan.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 932-41, bibl. 6, illus.

k PETERSON, R. G., JOSLYN, M. A., AND ROBINSON, R.
Nature of betanin, the pigment of red beet.
Nature, 1958, **182**: 45-6, bibl. 11.
The first authors conclude betanin is a pyrrole pigment, not a "nitrogenous anthocyanin"; the last author comments on this.

l PETZER, C. F.
Leaf spot disease of muskmelon caused by *Pleospora herbarum* (Pers.) Rabh. (conidial stage *Stemphylium botryosum* Wallr.). [Afrikaans and French summaries ½ p. each.]
S. Afr. J. agric. Sci., 1958, **1**: 3-24, bibl. 16, illus.
Dusting with zineb has shown promise.

m QUEBEC. INFORMATION AND RESEARCH SERVICE.
Guide de protection des légumes et des petits fruits, 1958. **(Plant protection guide for vegetables and small fruits, 1958.)**
[*Publ.*] *Minist. Agric. Quebec* **I.R.41,** 1958, pp. 64.
Short notes on pests and diseases of the various crops, and recommended control measures.

n REEKER, R.
Torfkultursubstrat und einheitliche Kalkmenge. **(The addition of a definite amount of chalk to peat used as a culture medium.)**
Torfnachrichten, 1957, **8**: 23-4, illus.
For cauliflower and lettuce 1·3–2·3 g. CaO per litre of peat.

o REINHOLD, J., AND ERNST, E.
Betrachtung über die Begriffe der Fruchtfolge in Anwendung auf den Gemüsebau. **(Observations on the concepts of crop rotation as applied to vegetable growing.)** [Russian and English summary 4 lines each.]
Arch. Gartenb., 1957, **5**: 257-64, bibl. 16 [received 1958].
A definition of concepts with practical examples.

p RICHARDS, R. R.
Some protective and forcing methods for outdoor vegetable crops.
Tasm. J. Agric., 1958, **29**: 158-64, bibl. 3, illus.
Plastic cloches; their design and use for tomato growing in Tasmania.

q ROGALEV, I. E.
Changes in the anatomical structure of the aerial organs of plants as affected by potassium nutrition. [Russian.]
Fiziol. Rast., 1956, **3**: 463-9, from *Ref. Ž.* (*Biol.*), 1957, No. 16, Abstr. 68,952.
In the stems and leaves of K-deficient bean and other plants cells of reduced size were formed. In bean stems the formation of xylem and its tracheids was depressed.

r SECRETT, A. W.
Asparagus.
J. roy. hort. Soc., 1958, **83**: 235-40.
As a garden crop.

s SERGEANT, G. A.
The determination of chlorinated hydrocarbon pesticide residues in plant material.
Analyst, 1958, **83**: 335-9, bibl. 16.
With examples of the application of the method to cabbages and tomatoes.

t STONE, O. M.
Cucumber mildew.
A.R. Glasshouse Crops Res. Inst. 1956, Littlehampton, 1958, pp. 112-17, bibl. 4.
Mainly a study of host plants.

u ŠUMANSKAJA, M. G.
Vegetative hybrids from the callus. [Russian.]
Agrobiologija, 1958, No. 1, pp. 67-75, illus.
Obtained at and 5–6 mm. above the graft union of tomatoes and incorporating characters of both components.

v TAYLOR, G. A., SMITH, C. B., AND FLETCHER, R. F.
Influence of some environmental and nutritional factors on incidence of internal browning of tomato.
Bull. Pa agric. Exp. Stat. **629,** 1958, pp. 21, bibl. 28.
See *H.A.*, 28: 1521.

w VAN MIDDELEM, C. H., AND WAITES, R. E.
Demeton residues in collards, lettuce, and mustard.
J. agric. Food Chem., 1958, **6**: 594-7, bibl. 8.
Determined by a cholinesterase inhibition technique.

x WRIGHT, R. C. M.
Horticulture in the Canaries.
Agriculture, Lond., 1958, **65**: 146-8.
Tomato growing for the European winter market described.

y v. ZEZSCHWITZ, E.
Behebung von Salzschäden durch Torfdüngung. (**The correction of salt injuries by means of peat.**)
Torfnachrichten, 1957, **8**: 19-20, illus. [received 1958].
In glasshouse lettuce.

TOBACCO.

General.

See 3856f, h, 3934.

Varieties.

(*See also* 3856a, e, i, j, p.)

3797. MADAMBA, U. V., AND EDROZO, L. B.
A progress report on the performance of five varieties of white burley tobacco under Luna, Mt. Province conditions.
Philipp. J. Agric., 1955 (issued 1958), **20**: 141-57, bibl. 9.

In a comparison of 5 varieties, figures are given for plant and leaf dimensions and yield. Yield differences were insignificant, but Johnson Root Rot Resistant yielded most. For quality Ky 16 was the best.

3798. EDROZO, L. B., MADAMBA, U. V., AND APOSTOL, H.
A preliminary study of five varieties of Turkish tobacco.
Philipp. J. Agric., 1955 (issued 1958), **20**: 209-23, bibl. 8, illus.

In a comparison of 5 varieties figures are given for plant and leaf dimensions and yield. For both yield and quality Samsoun was best, with Xanthi second.

3799. MÁNDY, G.
Növekedés élettani vizsgálatok kapadohányokkal. (**Investigations on the growth physiology of coarse tobaccos.**)
Dohányipar, 1957, No. 2, pp. 14-19, from *Hung. agric. Rev.*, 1957, **6** (4), Abstr. 275.

Twenty kinds of coarse tobacco were tested over 2 years under varying environmental conditions. In the drier sites and season nicotine contents were higher and the plants reached their maximum growth rate more rapidly than under wetter conditions. Leaf number was favourably influenced by May–June rains. Among the types tested Liège is considered to be the most suitable for breeding because of its rapid growth and high nicotine content. Good results were also obtained with Hajdu-Dorog foundation material and the curly types Folyási and Horvát.

3800. JONES, G. L., AND MANN, T. J.
Variations in Hicks variety of flue-cured tobacco.
Tobacco, N.Y., 1958, **147** (1): 20-3, bibl. 5.

Five lots of seed of the Hicks variety of flue-cured tobacco were compared in 1950 in replicated tests. Genetic differences were found for both agronomic and chemical characteristics. Individual plants were selected and grown in progeny rows and were again selected. The progeny of five of them were compared with the best lot of Hicks as a check in 1953. The Hicks variety produced plants which varied in as many as eleven or more distinctly different morphological and chemical characters. Line C–1–8 strongly resembled the check lot in appearance and was very uniform. It yielded more than the check and produced better quality, giving it an acre return comparable to the higher yielding lines. In addition it possesses the desirable characteristics commonly accredited to the Hicks variety. This line has been accepted as the source of breeders' seed for Hicks. It was possible to reselect within the Hicks variety and eliminate the variability due to natural crossing, mutation and mechanical mixture. To maintain purity it is recommended that rigid selection be practised with this and other flue-cured tobacco varieties. [Authors' summary.]

Soils and nutrition.

3801. ARGUDIN, J.
Importancía del pH en el suelo y su relación con el cultivo del tabaco. (**The importance of soil pH in relation to tobacco cultivation.**)
Agrotecnia, 1957, **7**: 41-6, from *Tob. Abstr.*, 1958, **2**, Abstr. 396.

Extremes beyond pH 4 or pH 8 are toxic to the tobacco plant. A table is given showing the relation between pH and the assimilation of various elements essential to the plant. In acid soil with pH as low as 4·5–5·0, Al, Fe and in some cases Cu and Zn may be toxic. The equilibrium between acid and basic constituents utilized by the plant varies greatly and directly with the reaction of the soil. This factor is most important in relation to both growth and quality.

3802. de Roo, H. C.
Fertilizing Connecticut tobacco.
Bull. Conn. agric. Exp. Stat. **613,** 1958, pp. 37, bibl. 69.

The needs of the crop and methods of application are fully examined. It is concluded that fertilizers rich in organic N such as oil seed meals are unnecessary and that $\frac{1}{2}$ to $\frac{3}{4}$ of the N supply can come from cheaper inorganic fertilizers. Nitrate of soda has given excellent results but is rapidly leached. Acid forming sources of N need to be neutralized. If quality is disregarded yields can be increased by applying 200 lb. N in natural organic form. The proper placement of fertilizer in bands is an important consideration.

3803. McIlvaine, T. C., Pohlman, G. G., and Browning, D. R.
Fertilizer experiments with tobacco.
Bull. W. Va agric. Exp. Stat. **402,** 1957, pp. 16, from *Tob. Abstr.*, 1958, **2,** Abstr. 31.

The application of 80 lb. of N produced a highly significant increase in yield and value of tobacco over the application of 40 lb. of N. The next increment of 40 lb. of N increased yield but not value. Ten tons of manure gave a highly significant increase in both yield and value of tobacco, but 20 tons of manure did not. The increase in K_2O application from 80 lb. to 160 lb. per acre produced a significant increase in both yield and value of tobacco, but a further 80 lb. did not.

3804. Badanova, K. A.
The resistance of plants to high and low temperatures in relation to the type of nitrogen applied. [Russian.]
Fiziol. Rast., 1958, **5**: 353-6, bibl. 8.

Mahorka [*Nicotiana rustica*] plants receiving $(NH_4)_2SO_4$ showed a higher heat, and lower cold, resistance than plants provided with $Ca(NO_3)_2$. Increased heat and reduced cold resistance was associated with increased viscosity and elasticity in the protoplasm.

3805. Schmid, K.
Vegetationsversuch über die Wirkung der Phosphorsäure-Düngung auf Ertrag und Qualität von Havanna II/c. **(Pot trials on the effect of phosphate fertilizer on yield and quality of Havanna II/c.**
Dtsch. Tabakb., 1957, **37**: 211-14, illus., from *Tob. Abstr.*, 1958, **2,** Abstr. 589.

Pot plants of the cigar variety Havanna II/c, when given medium to high amounts of superphosphate, Thomas phosphate and hyperphosphate on sandy, loam and acid soils, exhibited better development in the earlier stages of growth and produced higher yields and better quality, with no loss of burn quality, than did control plants. Differences between the fertilizers were slight, although the least expensive and least soluble (hyperphosphate) gave the lowest returns.

3806. Wedin, W. F., and Struckmeyer, B. E.
Effects of chloride and sulfate ions on the growth, leaf burn, composition and anatomical structure of tobacco (*Nicotiana tabacum* L.).
Plant Physiol., 1958, **33**: 133-9, bibl. 21, illus.

Tobacco plants grown in quartz sand culture at low SO_4 exhibited characteristic sulfur deficiency symptoms. Statistical analyses of average leaf length revealed highly significant reductions in size due to the low SO_4. Average length and weight of leaves decreased as SO_4 levels were increased beyond 96 p.p.m. Plants grown at low Cl exhibited no marked growth responses, but increases in Cl to 280 p.p.m. caused moderate increases in average length and weight of leaf. Inhibitive effects of high Cl on leaf burn were clearly demonstrated while effects of high SO_4 were not as marked. Effects of Cl and SO_4 ions on chlorine and sulfate sulfur percentage in the leaf were shown. Chlorine percentage in the leaf was increased to a greater extent than sulfate sulfur by additions of the respective ion to the substrate. Abnormalities in the stem structure were found with low SO_4. Increased leaf thickness was found at higher concentrations of the Cl and SO_4 ion. Variations in burn of tobacco leaves could not be explained on the basis of anatomical structure. [Authors' summary.]—Dep. Hort., Univ. Wis., Madison.

3807. Jordan, H. V., and Bardsley, C. E.
Response of crops to sulfur on southeastern soils.
Proc. Soil Sci. Soc. Amer., 1958, **22**: 254-6, bibl. 6.

On S-deficient soils, tobacco responded to applications of gypsum supplying 4–32 lb. of S per acre, the average increase in leaf tobacco being 261 lb. per acre. In most cases the lowest application, placed in a band near the seed drill, gave a full yield.

Temperature, light and water.

(*See also* 3822.)

3808. Pal, N. L., and Gopalachari, N. C.
Influence and mechanism of action of low temperature pre-treatment on germination of tobacco seeds.
Curr. Sci., 1958, **27**: 212-13, bibl. 6.

Tobacco seed germinated normally at temperatures between 17·8° C. and 27·8° C., but at higher temperatures germination fell off to reach only 9·0% at 37·8° C. Pre-soaking at low temperatures made it possible to obtain higher percentage germination at high temperatures, and this effect was additive, i.e. the longer the pre-treatment the better the eventual percentage germination in spite of high temperature. A theory of 2-stage germination is postulated. In the first stage a germination-inducing substance is formed unless temperatures are high, and this is followed by the actual germination which depends on the germination-inducing substance being present.—Cent. Tob. Res. Inst., Rajahmundry.

3809. SCHMID, K.
Der Einfluss der Temperatur und die Nachwirkung von Frostschäden an Setzlingen auf das Hauptwachstum der Tabakpflanze. **(The influence of temperature and the after-effect of frost damage to transplants on the growth of tobacco plants.)**
Dtsch. Tabakb., 1957, **37**: 221-4, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 58/143.

In pot tests plants transplanted at low temperatures showed growth injury and contained more nicotine and N and less sugar than plants transplanted at higher temperatures. Virgin L. was more sensitive to temperature than Havana IIc. Plants with dry soil at the roots during low temperature conditions grew better than those with wet soil. The first cold injury symptoms appeared at −2° C.

3810. MURAOKA, Y., AND OHORI, K.
Developmental response of tobacco plants to temperature in relation to photoperiodic conditions. [Japanese, with English summary.]
Proc. Crop Sci. Soc. Japan, 1956, **24**: 271-4, from *Biol. Abstr., Sect. D*, 1958, **32**, No. 13,580.

With Bright Yellow, a Virginia variety, treatments were paired, some plants being exposed to 13° C. during light and 23° during darkness, while alternates were exposed to 23° during light and 13° during darkness. In general, low temperature during light had more effect on the initiation of flowering than had low temperature during the dark. Similarly the shorter the "day" the earlier the flowering, and this was more conspicuous at 23° than at 13°. At either temperature, with 8 hours of daylight, flowering was initiated in 12 to 13 days, but with a 12-hour day at 13° flower buds appeared in 20 days, while at 23° no buds were initiated in 40 days.—Okayama Tob. Exp. Stat.

3811. WALKER, E. K.
Irrigation research with flue-cured tobacco.
Lighter, 1958, **28** (2): 1.

At Delhi, Ontario, irrigation increased grade index, yield and gross return and caused early maturity. Supplemental irrigation was of most value in July, and it was unnecessary to modify the fertilizer programme from that used for non-irrigated tobacco. The quantity of water supplied should depend on rooting depth as well as soil type. These depths for 2nd, 4th, 6th, 8th and 10th weeks of growth were 6, 9, 12, 15 and 20 in. Infiltration rate was 0·6 in./hr for a 1·5 hr period. The rate of water application should be between 0·3 and 0·75 in./hr for all flue-cured tobacco soils. Leaf contents of total N, total alkaloids and ether extract were inversely correlated with quantity of irrigation water. Irrigation also appeared to increase K, total sugars and Cl in the leaf and to decrease leaf thickness, rate of burn and % midrib.

3812. MILES, J. D.
Influence of irrigation on flue-cured tobacco in Georgia.
Circ. Ga agric. Exp. Stat. **8** (n.s.), 1957, pp. 19, from *Tob. Abstr.*, 1957, **1**, Abstr. 1,662.

Late irrigation (one inch weekly) consistently produced a higher total yield, acre value and yield of best grades than either continuous or non-irrigation treatments. Use of supplemental water generally induced favourable changes in the chemical properties of the leaf except where there were increases in Cl and S contents and decreases in the alkalinity number of the ash and specific volume. The fireholding capacity of the leaf was also improved.

Growth phenomena and regulation.

3813. TEJWANI, K. G., KURUP, C. K. R., AND VENKATARAMAN, K. V.
Measurement of leaf area of tobacco.
Indian J. Agron., 1957, **2** (1): 36-9, from *Tob. Abstr.*, 1958, **2**, Abstr. 389.

A regression equation for calculating the area of cigar and flue-cured tobacco leaves is reported. A formula is suggested for computing the total leaf area of a mature cigar tobacco plant by observing the area of its four middle leaves only.

3814. TEJWANI, K. G., KURUP, C. K. R., AND VENKATARAMAN, K. V.
Growth studies on and nutrient uptake by cigar tobacco—I.
Indian J. agric. Sci., 1957 (issued 1958), **27**: 317-27, bibl. 8.

Observations on total leaf area, accumulation of green and dry matter, stalk height and leaf emergence were taken for 13 weeks after transplanting. Growth could be divided into 4 phases, namely (1) the establishment phase, (2) the transitional phase when leaf area and dry matter rapidly increase, (3) the active phase when stalk growth is at a maximum and yield is most affected, and (4) maturation phase. Each of these phases tends to follow a cultural operation, namely (1) transplanting, (2) weeding, (3) deep hoeing and earthing up, and (4) topping.—Cent. Tob. Res. Stat., Rajahmundry.

3815. FERNANDO, L. H.
Interdependence of leaves.
A.R. Rothamsted exp. Stat. 1957, 1958, pp. 87-8.

Certain tobacco plants had some or all of the first 5 leaves removed when the 6th leaf was beginning to expand, and on other plants leaves 7–11 were cut off in succession as they appeared. No leaves were removed from the control plants. Loss of leaves 1–5 did not affect the growth of leaf 6, but decreased the size of subsequent leaves, particularly leaf 10. Removal of leaves above the 6th increased the size of leaf 6 and of the 12th and subsequent leaves. When all leaves after the 6th were removed as they formed, the first 6 grew for a longer period and reached a larger size than in the controls.

3816. BURK, L. G., AND TSO, T. C.
Effects of gibberellic acid on ***Nicotiana*** **plants.**
Nature, 1958, **181**: 1672-3, bibl. 2.

Seedling survival and new growth. Immersion of roots of tobacco seedlings in 10 p.p.m. GA for 10 min. before transplanting, or spraying the leaves with 1 p.p.m. G.A. after transplanting had no observable effect on survival or growth. *Shoot development.* Six injections of 15 μg.

GA were given at weekly intervals to plants of 5 species of *Nicotiana*, starting 2 weeks after transplanting. At 10 weeks the treated plants were one-third taller than the controls, but the difference was less marked at the end of the season. Leaves were longer, curled at the margins and more subject to sun-scalding, but flowering was not affected. *Alkaloids.* Application of GA to leaves of *N. tabacum* and *N. rustica* reduced the yield of alkaloids, the effect increasing with concentration of GA. Growing plants in nutrient solutions containing 1 p.p.m. GA also reduced the alkaloid content. No change was observable in the composition of the alkaloids. *Induction of flowering.* GA was applied to the growing point or centre of the rosette of 10 species of *Nicotiana*. Generally GA did not affect flowering of the non-rosette species, but induced earlier flowering of the rosette species, which are long-day plants.—Plant Indust. Stat., Beltsville, Md, and Univ. Md, College Park.

3817. YAGER, R. E.
The mechanism of floral abscission in *Nicotiana*.
Diss. Abstr., 1957, **17**: 2785, being *Publ.* 23,799 of 164 pp.

Anatomical, physiological and enzymic characteristics of floral abscission were studied in Lizard's Tail and Little Turkish varieties of *Nicotiana tabacum*. Flower abscission was accelerated in proportion to the number of immature leaves removed. This acceleration of abscission was prevented by the application of IAA at concentrations of 100–10,000 p.p.m. to exposed nodes. Ovary removal also accelerated abscission, but IAA applied to the pedicels again prevented this acceleration; at 1,000 p.p.m. and above IAA also induced parthenocarpy. Methionine applications to the unfertilized ovary also accelerated abscission, the time taken being reduced as the concentration increased [see also *H.A.*, 28: 1573]. In combined applications of IAA and methionine, the effect of the latter was suppressed. The effects of methionine and IAA on abscission suggest that these compounds control esterification or de-esterification of the pectic middle lamella. Differences in varietal response are related to the number of cells involved in the abscission process, to enzyme activity and to carbohydrate levels.—St. Univ. Iowa.

3818. CLARK, F.
Chemical sucker control for flue-cured tobacco.
Circ. Fla agric. Exp. Stats **S-93**, 1956, pp. 8, illus. [received 1958].

Maleic hydrazide gave better results than NAA and white mineral oil. MH at 7 pints/acre is recommended [see also *H.A.*, 27: 589] and should be applied when 80–90% of the plants are in flower. Uniform spraying is essential. Sucker control is not recommended during very dry conditions if the crop has been heavily fertilized; the suckers in this case help to use up excess N.

3819. DIMITROV, L., AND ANASTOV, A.
Ringing tobacco and its practical uses. [Bulgarian.]
Selkostop. Misyl., 1956, **1**: 531-7, from *Tob. Abstr.*, 1958, **2**, Abstr. 430.

Sulphuric acid applied with a cotton swab to tobacco stems, 10 cm. above the ground, at the time of full flowering destroys the cortex and interrupts the downward flow of metabolites in the phloem. Dilutions of 1: 8 and 1: 6 should be used for aromatic and flue-cured tobaccos respectively. Investigations, using the varieties Virginia and Kosarsko 541, showed that one person could treat 8,000 plants a day compared with 200 plants ringed by cutting. The treatment reduced sucker formation, increased the leaf dry matter content by 13% and the carbohydrate content by 8%, and reduced the ash content by 22%. There was also a slight but unimportant reduction in the nicotine content.

Physiology and biochemistry.

(*See also* 3271, 3817, 3836, 3837, 3841.)

3820. WEYBREW, J. A., AND MANN, T. J.
Some observations on the elaboration of plastid pigments in tobacco.
Tobacco, N.Y., 1958, **146** (24): 20-4, bibl. 14.

The virescent wrapper tobacco variety Consolation arose as a mutation. The leaves remain greenish-yellow until the plants are nearly full grown and then turn green. In the studies reported here comparisons were made between F_5 selected virescent hybrids of Consolation × 402 and Consolation × Ky 16 and the parental flue-cured and burley varieties 402 and Ky 16. The authors summarize their results as follows: "Both the total amount of chlorophyll and the proportion of chlorophyll *b* in the virescent Consolations increased as they turned green in the field. As demonstrated by shading experiments, light intensity seems to be a negative factor in this greening. Both chlorophyll *a* and *b* in immature leaves of Consolation were relatively resistant to destruction during pile-yellowing. Results from these experiments and other observations suggest that chlorophyll might shield carotenoids from photo-oxidation in growing plants. During pile-yellowing, 'carotene' increased in immature Consolation leaves, whereas in 402 and Ky 16 it decreased markedly while 'xanthophyll' remained essentially constant." [See also *H.A.*, 28: 585.]

3821. PENN, P. T., AND HALL, J. L.
Cherry red tobacco.
Res. and Fmg N.C., 1958, **16** (4): 8, illus.

Red coloration of tobacco is an inherited factor, appearing as a strain in several varieties. Light is required for the formation of red pigment, which contains chlorogenic acid. In cured cherry-red leaf nornicotine is the main alkaloid present. The pigment appears late during curing, following yellowing. The degree of redness is directly related to the temperatures above 150° F. during this final drying phase.

3822. MOTHES, K., AND OTHERS.
Wurzelaktivität und Nikotinbildung. (**Root activity and nicotine formation.**)
Flora, 1957, **144**: 518-36, illus., from *Tob. Abstr.*, 1957, **1**, Abstr. 1,772.

Nicotiana spp. which are sensitive to photoperiod show stimulation of root development and of nicotine formation during a day-night rhythm which inhibits flower formation. *N. sylvestris* plants cultivated under short-day conditions become perennial, remain in the rosette stage and show a higher nicotine: nornicotine ratio in the shoot than do flowering plants. These differences are not directly conditioned by photoperiod.

Demethylation is a function of ageing and dying. Since short-day plants continue to grow new leaves, their alkaloid spectrum resembles more closely that of young plants. Day-neutral tobacco shows no significant differences in nicotine formation when exposed to varied day-night ratios. Tobacco plants deprived of all save one bud and leaf during the flower-formation stage show an absolute increase in nicotine of 250-fold and a relative increase (calculated for dry weight) of 20-fold more than controls. If the roots of *N. rustica* leaf cuttings are cut back repeatedly, more nicotine is produced than in normal leaf seedlings. There is no increased absorption of N. Normal leaf seedlings show similarly increased acid amide instead of high nicotine values. Nicotine synthesis in roots which were no longer growing was not achieved. Possible relationships between growth and alkaloid synthesis are discussed. Alkaloid and albumin synthesis conform since growth is generally tied to albumin synthesis, but there is no stoichiometric relationship between root-albumin and total nicotine synthesis. A direct relationship between both processes seems less probable.

3823. Leete, E.
The biogenesis of nicotine. V. New precursors of the pyrrolidine ring.
J. Amer. chem. Soc., 1958, **80**: 2162-4, bibl. 20.

Nicotiana tabacum plants were allowed to grow for varying lengths of time, up to 9 weeks, after feeding ornithine–2–C^{14} to the roots of the plant. The activity of the nicotine reached a maximum after 3 weeks and then slowly decreased. Glutamic acid–2–C^{14} proline (uniformly labeled with C^{14}) and putrescine–1,4–C^{14} were fed to the tobacco plant, and radioactive nicotine was obtained in each case. Degradation of the nicotine from these experiments showed that all the activity was present in the pyrrolidine ring. Under similar conditions the incorporation of ornithine, putrescine, proline and glutamic acid into nicotine was 0·48, 0·12, 0·032 and 0·0078% respectively. The significance of these results is discussed. [Author's abstract.—For part IV see *H.A.*, 28: 566.]—Univ. Calif., Los Angeles.

3824. Il'in, G.
The biosynthesis of nicotine-C^{14}. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **119**: 544-6, bibl. 2.

Using C^{14} in sodium bicarbonate, glycine, tyrosine and acetic acid applied in nutrient solutions to tobacco, it was shown that acetic acid was the most active of the compounds in the synthesis of nicotine in the roots. Nicotine was synthesized in the roots of plants from which the aerial parts had been cut off at the root neck.

3825. Schroeter, H. B.
Zue Frage der Umwandlung von Nikotin in Anabasin im Spross von *Nicotiana glauca.* **(The problem of the conversion of nicotine into anabasine in the bud of *Nicotiana glauca*.)**
Z. Naturforsch., 1957, **12**: 334, from *CORESTA Inf. Bull.*, 1958, No. 1, Abstr. 1,085.

When nicotine labelled with C^{14} was injected into the leaves and buds of *N. glauca*, both the nicotine and nornicotine subsequently extracted were radioactive, but the anabasine was not. This indicates that the injected nicotine underwent partial demethylization but that there was no conversion into anabasine.

3826. Dymicky, M., and Stedman, R. L.
Composition studies on tobacco. I. β-Sitosteryl D-glucoside from flue-cured tobacco leaves.
Tobacco, N.Y., 1958, **147** (3): 22-4, bibl. 17.

The initial attempt to identify the steroidal composition of American flue-cured tobacco is described. β-Sitosteryl D-glucoside was isolated and characterized. Difficulties in characterizing sitosterol glycosides and the correlation between the current report and other published studies on related subjects are discussed. [Authors' summary.]—East. reg. Res. Lab., Philadelphia, Pa.

3827. Penn, P. T., and Weybrew, J. A.
Some factors affecting the content of the principal polyphenols in tobacco leaves.
Tobacco, N.Y., 1958, **146** (21): 20-4, bibl. 23, illus.

The major polyphenols present in the fresh leaves of three flue-cured varieties, Coker 139, Hicks 402 and Dixie Bright 244, when grown according to standard practices, were found to be qualitatively similar. The predominant compounds on paper chromatograms were identified as chlorogenic acid, scopolin, rutin, and scopoletin. Other polyphenols having low Rf values were in evidence but were not identified; it has been suggested that some of these substances may be similar to the caffetannins. Extracts of leaves harvested from plants which had been grown in the greenhouse contained no rutin and, in general, much less polyphenolic materials. The polyphenolic constituents were found to increase with maturity. During flue-curing, qualitative and quantitative changes occurred; rutin decreased progressively, while there were substantial increases in scopoletin and unidentified yellow-fluorescent substances having low Rf values. Caffeic acid, which was not detected in fresh leaves, became evident during the later stages of curing. Only minor contrasts in the polyphenols were noted between flue-cured (402) and burley (Ky 16) when both had been cultured and cured alike. Either type, when cultured like burley, contained markedly less chlorogenic acid, rutin, and caffeic acid than when grown like flue-cured. Similarly, air-cured leaves of either type were lower in polyphenols than their flue-cured counterparts. [Authors' summary.]—N.C. State Coll., Raleigh.

3828. Giovannozzi-Sermanni, G.
Au sujet de la teneur en acides chlorogénique et caféique de quelques tabacs italiens. Comparaison entre deux méthodes de dosage. **(Concerning the levels of chlorogenic and caffeic acids in some Italian tobaccos. Comparison between two methods of determination.)** [French and English.]
CORESTA Inf. Bull., 1958, No. 1, pp. 13-19, bibl. 7.

Investigation of the analytical procedure involving the use of hypo-iodite [*H.A.*, 25: 1832] showed that it was insufficiently specific to permit accurate determination of chlorogenic and caffeic acids. The author's chromatographic method following extraction in dilute alcohol [*H.A.*, 28: 2777] proved reliable, and was used in studies on different varieties and on the effects of topping and curing. Among 4 types of tobacco the highest contents of both acids were found in Bright (flue-cured) and the next highest in Maryland Benincasa (air-cured); the other varieties, Scafati 7 (air-cured) and Kentucky (fire-cured) contained negligible amounts. In a preliminary investigation, topping Maryland Benincasa plants increased the caffeic acid content but did not affect the chlorogenic acid content. When Maryland Benincasa leaves were cured the chlorogenic acid content declined but the caffeic acid content remained unaltered.

3829. Frey-Wyssling, A., and Baebler, S.
Zur Biochemie des Gewächshaustabaks. **(The biochemistry of tobacco grown in the greenhouse.)**
Experientia, 1957, **13**: 399, from *CORESTA Inf. Bull.*, 1958, No. 1, Abstr. 1,052.

When grown in a greenhouse, tobacco produced no rutin and only about one-seventh of the normal amount of chlorogenic acid. Treatment with ultraviolet light resulted in the chlorogenic acid content reaching normal levels, but did not stimulate the synthesis of rutin. The plants treated with ultraviolet light showed marked morphogenetic changes.

3830. Murphy, E. L.
A study of certain flavonoid compounds in the leaves and flowers of tobacco.
Diss. Abstr., 1958, **18**: 55-6, being *Publ.* 24,421 of 87 pp.

Among the flavonoid compounds isolated and identified in tobacco leaves were 2 methyl esters of quercetin which have not previously been reported in a natural product. A method for the quantitative determination of rutin in fresh leaf tissue has been developed, and used to measure the effect of gibberellic acid treatment on rutin content. Following gibberellic acid treatment there was a significant increase in rutin content of young leaves; rutin content was also increased by treatment with a sublethal dose of X-rays.—Univ. Okla.

3831. Kozłowska, A.
Stadia rozwojowe siewek tytoniu w zależności od pór roku i stanu dynamicznego substancji białkowych. **(Dependence of developmental stages of tobacco seedlings on season and albumin metabolism.)**
Rolnictwo, 1956, No. 1, pp. 5-23, from *Tob. Abstr.*, 1958, **2**, Abstr. 544.

Batches of tobacco seedlings were raised every 6 weeks from January to October. Throughout most of the year the content of free amino acids in the leaves increased as the leaves became older from 4·2 to 8·2% of dry matter. In late November, however, it suddenly decreased to levels corresponding with the earliest stage of development. In the case of plants raised from seed sown in October the content of amino acids remained at this low level throughout the winter, and the respiration rate was also low during this period. The overwintered plants showed no further development with the advent of spring.

3832. Mihajlov, M. K.
The amino acid composition of tobacco.
[Russian, with English summary 5 lines.]
C.R. Acad. bulg. Sci., 1958, **11**: 85-8, bibl. 11.

Investigations on the free and bound amino acids in samples of Bulgarian fermented tobacco showed that: (*a*) the amino acid composition of tobacco from different sources varied; (*b*) the bound amino acid composition of all tobaccos from a single source was the same; (*c*) the number and qualitative composition of the free amino acids varied both in different grades of tobacco from a single source and in tobaccos from different sources; and (*d*) no clearly expressed relationship existed between quality of the tobacco and the actual amounts present of either the free or bound amino acids.

3833. Zawadzki, K.
Content of citric acid in tobacco.
Acta Agrobot., 1956, **4**: 5-11, from *Tob. Abstr.*, 1957, **1**, Abstr. 926.

As tobacco plants grow the citric acid content increases, to reach a maximum of about 4·41% at the time of flowering. The lower leaves contain more citric acid than the upper leaves.

3834. Bellin, S. A., and Smeby, R. R.
Malonic acid in green and cured American and oriental tobaccos.
Arch. Biochem. Biophys., 1958, **75**: 1-5, bibl. 18.

Samples of flue-cured, burley and Turkish tobaccos contained 3·5 to 5·9 mg. malonic acid per gram dry weight. All the tobaccos contained more malonic acid than succinic acid, and in some cases its concentration was about half that of the citric acid present. Thus, quantitatively, malonic acid must be regarded as one of the more important organic acids of tobacco. In growing plants the concentration of malonic acid showed an almost linear increase until the time of ripening.—Res. Dep., R. J. Reynolds Tob. Co., Winston-Salem, N.C.

3835. Onishi, I., and others.
Studies on the essential oils of tobacco leaves. XVI. Neutral fraction (3). Polycyclic aromatic hydrocarbons of burley tobacco leaf.
Bull. agric. chem. Soc. Japan, 1958, **22** (1): 17-20, from *Tob. Abstr.*, 1958, **2**, Abstr. 579.

Liquid chromatography of the steam-distilled neutral fraction yielded the following hydrocarbons (in mg./kg.): phenanthrene 5·00, anthracene 4·21, pyrene 1·80, fluoranthene 1·38. The neutral fraction, 7·3%, is less than in Japanese flue-cured leaf; total aromatic hydrocarbons, however, are higher. This indicates that Japanese burley leaf is rich in aromatic compounds.

Diseases and pests.

(*See also* 3234, 3598, 3854, 3856b-d, g, k, l, n, o.)

3836. OWEN, P. C.

Physiological effects of virus infection. Respiration and photosynthesis of infected leaves.

A.R. Rothamsted exp. Stat. 1957, 1958, pp. 94-5.

Photosynthesis and respiration rates of leaves of *Nicotiana glutinosa* infected with tobacco mosaic and of *N. tabacum* infected with potato virus X.

Some effects of virus infection on leaf water contents of *Nicotiana* species.

Ann. appl. Biol., 1958, **46**: 198-204, bibl. 5, and 205-9, bibl. 5.

When tobacco leaves were infected with potato virus X, the rates of respiration and photosynthesis were unaffected until the leaves showed symptoms; the respiration rate was then increased by more than 30% and the photosynthesis rate decreased by 20%. The rates of respiration and photosynthesis of leaves of *Nicotiana glutinosa* were unaltered by infection with TMV until local lesions appeared; the respiration rate was then increased by an amount which varied with the number of local lesions, and the rate of photosynthesis was decreased by 20%. With neither of these virus/host combinations was there any effect on photosynthesis or respiration for several days after inoculation. These results differ greatly from those previously reported for tobacco leaves infected with TMV, the respiration and photosynthesis rates of which were affected from within 1 hour of inoculation [see *H.A.*, 28: 573]. Similarly, the water content of tobacco leaves inoculated with TMV and then kept for 20 hours in a saturated atmosphere was less than that of comparable uninfected leaves held in the same conditions, but no such effect on water content during the first day after inoculation was found in tobacco leaves infected with potato virus X or tobacco etch virus, nor with *N. glutinosa* leaves infected with TMV. [From author's report.]

3837. SCHLEGEL, D. E.

The organic acid composition of healthy and tobacco mosaic virus-infected tobacco plants.

Virology, 1958, **6**: 1-7, bibl. 9.

Healthy detached leaves of Turkish tobacco, which were floated on water for 4 days, contained about eight times more glyceric acid than did comparable leaves infected with tobacco mosaic virus. Time-series studies indicated that glyceric acid accumulated in both healthy and diseased detached leaves during the first 3 days after detachment but then decreased more rapidly in diseased leaves. Healthy and diseased leaves from intact plants contained only a trace of glyceric acid and did not show these differences. It is suggested that the lower glyceric acid content of virus-infected, detached leaves is due either to a greater rate of utilization of the acid, a decrease in the rate of glyceric acid production, or both. [Author's abstract.]—Univ. Calif., Berkeley.

3838. WEINTRAUB, M., AND KEMP, W. T.

The effect of darkness on lesion production in *Nicotiana glutinosa*, L.

Canad. J. Bot., 1958, **36**: 455-6, bibl. 2.

Comparison, in the dark and light, of *N. glutinosa* plants inoculated with TMV indicates increased susceptibility in the dark. Rubbing with carborundum produces injury lesions similar to virus lesions, and so may give misleading results in virus assay studies. [Authors' abstract.]—Plant Path. Lab., St. Catherines, Ont.

3839. HIRAI, T., AND OTHERS.

Chemotherapy for plant virus diseases. I. Screening tests of the new antibiotics for their effect on tobacco mosaic virus (TMV) multiplication in tobacco leaf. [Japanese.]

Nippon Shokubutsu Byori Gakkaiho, 1957, **22**: 70-4, from *Tob. Abstr.*, 1958, **2**, Abstr. 456.

In tests with crude preparations of antibiotics 24 out of 62 samples exhibited 20% or more virus inhibition. The highest degree of inhibition was 58%.

3840. GRUŠEVOJ, S. E.

The tomato bronzing virus of tobacco and mahorka [*Nicotiana rustica*]. [Russian.]

Sb. nauč. issled. Rabot Vses. n.-i.In-t Tabaka i Mahorki, 1956, No. 149, pp. 266-88, from *Ref. Ž.* (*Biol.*), 1957, No. 16, Abstr. 69,562.

It is suggested that ringspot, tip chlorosis and virus deformity of tobacco are caused by different forms of tomato bronze leaf virus. They are transmitted by tobacco thrips, to control which soil treatment with BHC and spraying with DDT are recommended.

3841. SIROTENKO, A. A.

Biochemical characteristics of varieties of mahorka [*Nicotiana rustica*] that are slightly susceptible to tip chlorosis. [Russian.]

Sb. nauč.-issled. Rabot Vses. n.-i.In-t Tabaka i Mahorki, 1956, No. 149, pp. 122-30, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 78,241.

Comparisons were made between 2 susceptible and 2 slightly susceptible varieties. The slightly susceptible varieties were distinguished by lower nicotine, total N and protein, but catalase and peroxidase activities were similar in both types. Compared with healthy plants diseased plants accumulated more water-soluble carbohydrates, reducing substances and polyphenols and less nicotine, total N, proteins, ash, Mg, K and P. Citric acid and calcium contents were similar; peroxidase activity was higher and catalase activity lower.

3842. WHEELER, B. E. J.

Investigations on *Alternaria* leaf-spot of flue-cured tobacco in Nyasaland.

Misc. Publ. Commonw. mycol. Inst. **15**, 1958, pp. 32, bibl. 11, 5s. 0d.

A survey showed that the disease was more prevalent on second year land, on heavy soils, where high N or low P and K had been applied and where supplementary fertilizer side dressings were used. The fungus could survive the dry season on tobacco debris which was the main source of infection. Survival in the soil alone was limited to 1 month in dry soil or 7–14 days in moist soil. Alternative hosts among the indigenous plants were not found. High humidity favoured spore production and dry sunny weather favoured subsequent spore dispersal. Experiments on seedling infection are described, but leaf-spot is normally observed only 2–3 weeks before ripening when the susceptibility of the leaves increases. Low topping tended to produce coarse heavy leaves more liable to infection. Certain fungicides gave a measure of control, but this can best be effected by attention to field sanitation, land selection and fertilization.

3843. McGrath, H., and Miller, P. R.
Blue mold of tobacco.
Suppl. Plant Dis. Reptr **250,** 1958, pp. 35, bibl. 200, illus.

This comprehensive review of blue mould or downy mildew of tobacco, caused by *Peronospora tabacina*, covers, among other things, the history of the disease in Australia and the U.S.A., its epidemiology as affected by temperature, sources of inoculum and methods of dissemination, the symptoms produced in both seed beds and the field, and the effects on its severity of cultural practices. Control by fungicides applied as gases, sprays and dusts is discussed in detail, and attempts being made to develop resistant varieties are outlined.

3844. Miller, P. M., and Taylor, G. S.
Superior control of tobacco stunt nematodes with a nematocide mixture.
Abstr. in *Phytopathology*, 1958, **48**: 264.

In plots fumigated with 12 gal./acre of Dorlone (a mixture containing 19% ethylene dibromide (EDB) and 75% 1,3-dichloropropene) the average plant height of shade tobacco was 84% greater than that of plants in untreated plots. This difference in average plant height was greater than that provided by 16 gal./acre of Dorlone or by treatment with either of the 2 active ingredients of Dorlone, 16 or 20 gal./acre of Telone (technical 1,3-dichloropropene) or 4·5 gal./acre of Dowfume W-85 (85% EDB). Tobacco grown in this same field was severely stunted in 1956 by heavy infestations of the tobacco stunt nematode, *Tylenchorhynchus claytoni*. Soil tests showed little difference in fertility among plots. Greenhouse tests indicated uniformly low populations of root-rotting organisms. Differences between treatments, therefore, were apparently caused by nematode control during early plant growth, even though stunt nematode populations were low 6 weeks after planting. (This period was one of high soil temperatures and low soil moisture.) A combination of nematocides improved control where 1 type of nematode predominated. Improved control of mixed nematode populations with nematocide combinations is indicated.

3845. Stanley, J. M., and Dominick, C. B.
Response of tobacco- and tomato-hornworm moths to black light.
J. econ. Ent., 1958, **51**: 78-80, bibl. 10.

Mechanical- and suction-type traps were tested in 3 tobacco fields near Chatham, Va, to study the response of tobacco hornworm (*Protoparce sexta*) and tomato hornworm (*P. quinque-maculata*) moths to black light [approaching the ultraviolet region of the spectrum] and to evaluate these devices as a means of controlling hornworms. The percentage of plants damaged in the test fields in comparison with check fields, in most cases indicated a slight suppression of damage where traps were used; however, they did not give the desired control. [From authors' abstract.]

3846. Entomology Faculty, North Carolina State College. (Townes, H. K., and others.)
Insecticide residues as a source of off-flavour in tobacco.
Tobacco, N.Y., 1958, **146** (26): 20-4, bibl. 4.

Soil residues resulting from applications of BHC caused an objectionable off-flavour in tobacco. When such residues were a result of grower applications to cotton, it was found that the flavour of only the first succeeding tobacco crop was affected. Soil residues of toxaphene, aldrin, dieldrin and heptachlor did not adversely affect the flavour of tobacco. Foliar applications of toxaphene, strobane, demeton, and bulan produced objectionable flavours in tobacco. Recommended rates of TDE, endrin, malathion, aldrin, chlordane, heptachlor, dieldrin and chlorthion did not affect flavour, although excessively high rates of endrin and TDE were questionable. It was found that toxaphene applied to tobacco within ten days of harvest could be identified by smoking panels. Drift of BHC from cotton treated for insect control caused off-flavour in tobacco grown in adjacent fields. Setting water treatments with demeton, schradan, lindane, and thimet did not affect flavour of tobacco. [From authors' summary.]

Harvesting and curing.

(*See also* 3821, 3856m.)

3847. Toussaint, W. D., and Chumney, W. T.
When does a tobacco harvester pay?
Res. and Fmg N.C., 1958, **16** (4): 4.

With a 5-year life a self-propelled harvester must handle 27 acres annually to be less costly than hand harvesting. Annual costs of fixed machines are lower, and with a life of 10 years the machines are an economic proposition when more than 16 acres are to be harvested. [See also *H.A.*, 28: 1593.]

3848. Dorr, W.
Vergleich der Einzelblatternte und der kombinierten Ganzpflanzenernte an deutschem Burley. **(Comparison between priming and priming followed by stalk cutting of German burley tobacco.**
Dtsch. Tabakb., 1957, **37**: 121-3, from *Tob. Abstr.*, 1958, **2,** Abstr. 638.

In the burley area of North Baden only one variety, Burley E, is grown commercially. Priming is the current method of harvesting, but it does not result in leaf of the quality and colour required by the cigarette or cigar trades. Studies have shown that the following harvesting procedure would result in improved quality and returns:—Priming the lower leaves and curing these for cigar wrapper; topping after priming, when the flowers are first open; and, 2–3 weeks later, cutting and curing the stalks.

3849. Vincent, L.
Comparaison de la cueillette en tiges et de la cueillette mixte. **(Comparison of stalk-cutting and stalk-cutting following priming.)**
Proc. 5th Congr. UNITAB, Paris, 1957, from *Tob. Abstr.*, 1958, **2,** Abstr. 645.

Stalk-cutting following priming gave increased mean weights of 20% for lower leaves, 10% for centre leaves and 11·5% for top leaves compared with stalk-cutting alone. Quality was increased markedly. The method is recommended for southwestern France.

3850. Pack, A. B.
Influence of wet-bulb temperature during curing on properties of shade-grown tobacco.
Bull. Conn. agric. Exp. Stat. **612,** 1958, pp. 23, bibl. 2.

Air-conditioned cabinets described in an earlier paper [*H.A.*, 27: 1646] were used to investigate the effects of curing temperature on the quality of Connecticut 49 shade-grown tobacco. Two treatments were compared, viz. a low temperature cure (89° F. dry-bulb, 61% R.H. and 78° F. wet-bulb) and a high temperature cure (98° F. dry-bulb, 70% R.H. and 88° F. wet-bulb). The aim was to provide two widely different wet-bulb temperatures, while maintaining the same vapour pressure deficit or drying capacity of the air. Two lots of tobacco were compared, an early priming (the 2nd) and a late (the 5th). The results indicate that, at equal rates of drying, the rate of yellowing appeared to be independent of wet-bulb temperature differences, but that the formation of brown pigments was accelerated at the higher temperature. At the higher temperature muddiness or black pigmentation was pronounced in leaves of the early priming but was only slight in leaves of the late priming. In leaves of both primings the higher temperature resulted in a faster rate of dry matter loss but in a slower rate of protein breakdown. The laminae of fresh leaves of the early priming contained 2·93 g. protein-N per kg. green weight compared with 3·95 g. in the later picking.

3851. Zelitch, I., and Zucker, M.
Changes in oxidative enzyme activity during the curing of Connecticut shade tobacco.
Plant Physiol., 1958, **33**: 151-5, bibl. 11.

The rate of oxygen uptake by intact tobacco leaf tissue and the activities of malic dehydrogenase, polyphenol oxidase, L-glutamic acid dehydrogenase, diaphorase, and glycolic acid oxidase in extracts have been studied at intervals during the process of air curing. Both the enzymic activities and the respiration rate decreased rapidly during the first 13 days, and it is suggested that the major oxidative changes involved come to a halt as a result of inactivation of the enzymes. Many of the soluble proteins including certain enzymes undergo alteration during curing. [From authors' summary.]—Conn. agric. Exp. Stat., New Haven.

3852. Gej, B.
Wstępne badania nad oddychaniem liści tytoniu Virginia w czasie suszenia. (**Preliminary studies on the respiration of Virginia tobacco leaves during drying.**)
Przemysł Spoż., 1957, No. 7, pp. 302-5, from *Polish tech. Abstr.*, 1958, No. 1 (29), Abstr. 5,257.

Investigations, in which leaves of Virginia tobacco were cured at a constant temperature and also in an electric desiccator, showed that respiration reached a maximum with the onset of yellowing and coincided with the accumulation of reducing sugars.

3853. Torčinskaja, V. M.
The effect of 2,4-D on nitrogen metabolism in lupin seedlings and in leaves of *Nicotiana rustica* during curing. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **120**: 1144-6, bibl. 11.

2,4-D infiltrated into harvested mahorka leaves retarded protein metabolism during curing, and the ammonia liberated by the deaminization of the amino acids was not used for amide synthesis but accumulated in the tissues.

3854. Stephen, R. C.
Barn-rot disease of flue-cured tobacco in Southern Rhodesia.
Emp. J. exp. Agric., 1958, **26**: 247-53, bibl. 11.

Preliminary experiments were carried out on the effect of factors associated with the curing environment on barn-rot disease [*Rhizopus arrhizus*] development during the colouring period. The onset of the disease was faster, and the subsequent damage greater, as the yellowing temperature was increased from 80 to 110° F. and when the relative humidity was raised from 50 to 100%. These factors operated independently, though the evidence was insufficient to determine which was the more important. The more mature the leaf at reaping, the quicker was the onset of the disease. Slightly more damage appeared to occur on immature leaf, as compared with overripe leaf, possibly because it took longer to yellow. [Author's summary.]—Tob. Bd Rhod. Nyasal.

3855. Parups, E. V.
Volume of pores of Canadian tobacco.
Tobacco, N.Y., 1958, **146** (20): 20-3, bibl. 7.

The volume of pores and their distributions were determined for several types and grades of Canadian tobacco as well as on three curing treatments of burley cutter leaf. Flue-cured, cigar, and burley tobaccos exhibited distinct differences in their total volume of pores. The highest volume of pores per unit weight was shown by flue-cured tobacco followed by cigar and burley tobaccos. Curing practices of burley tobacco influenced its volume of pores: the air-cured tobacco had the lowest volume of pores followed by $CaCl_2$-cured and propane gas-cured. Limitations and implications of these determinations are discussed. [Author's summary.]—Tob. Div., exp. Fms Serv., Canada Dep. Agric., Ottawa.

Noted.

3856.

a Clayton, E. E.
The genetics and breeding progress in tobacco during the last 50 years.
Agron. J., 1958, **50**: 352-6, bibl. 41.

b Coursen, B. W., and Jenkins, W. R.
Host-parasite relationships of the pin nematode, *Paratylenchus projectus*, on tobacco and tall fescue.
Plant Dis. Reptr, 1958, **42**: 865-72, bibl. 6, illus.
Tobacco plants stunted but with increased root weights.

c Davern, C. I., and Bonner, J.
The influence of 5-fluorouracil on tobacco-mosaic virus production in tobacco-leaf discs.
Biochem. biophys. Acta, 1958, **29**: 205-6, bibl. 6.
Inhibitory effect at high concentration attributed to derangement of host metabolism.

d Goodchild, D. J., Cohen, M., and Wildman, S. G.
The specific activity of tobacco mosaic virus as a function of age of infection.
Virology, 1958, **5**: 561-6, bibl. 6.
Measured in 3 ways; specific activity remained constant for 30 days.

e Hornung, H.
Ertrags- und Qualitätsleistungen neuer Virginzüchtungen. **(Yield and quality performance of new flue-cured breeding lines.)**
Dtsch. Tabakb., 1957, **37**: 201-3, illus., from *Tob. Abstr.*, 1958, **2**, Abstr. 715.
Characteristics of 2 promising Forchheim selections, 230/1 and 232, now undergoing commercial trials.

f Krishnamurty, I. V. G.
Production and processing of tobacco seed.
Indian Tobacco, 1958, **8**: 37-41.
The methods used at the Central Tobacco Research Institute, Rajahmundry.

g Mickovski, J.
Control of tobacco powdery mildew. [Yugoslav.]
Tutun, 1957, pp. 91-105, from *CORESTA Inf. Bull.*, 1958, No. 1, Abstr. 1,189.
Karathane effective at 0·06–0·14%, when applied at 10–20-day intervals.

h Mulherin, K. S.
The Southern Rhodesian tobacco industry.
Quart. Rev. agric. Econ., Canberra, 1958, **11**: 30-4.
Including data on production and trade.

i Ogden, W. B., and Tibbitts, T. W.
Wisconsin tobacco varieties.
Bull. Wis. agric. Exp. Stat. **528**, 1957, pp. 4.
Havana and Seedleaf types described, with notes on a certified seed scheme.

j Onishi, I.
Isolation of γ-phytadiene from the essential oil of tobacco leaf.
Bull. agric. chem. Soc. Japan, 1958, **22** (1): 57-8, from *Tob. Abstr.*, 1958, **2**, Abstr. 578.
As 20 mg./kg. in Japanese flue-cured, and 56 mg./kg. in Japanese burley, tobacco.

k Rappaport, I.
Kinetics of antibody inactivation of tobacco mosaic virus.
J. Immunol., 1957, **78**: 256-8, from *Tob. Abstr.*, 1958, **2**, Abstr. 619.

l Rappaport, I., and others.
Comparative study of antibody inactivation of tobacco mosaic virus.
J. Immunol., 1957, **78**: 259-61, from *Tob. Abstr.*, 1958, **2**, Abstr. 618.
Studies on 5 strains of TMV inactivated by 3 different rabbit antisera.

m Schmid, K., and Hornung, H.
Zur Technik der Ganzpflanzenernte. **(Stalk-cutting methods.)**
Dtsch. Tabakb., 1957, **37**: 47-9, illus., from *Tob. Abstr.*, 1958, **2**, Abstr. 643.
Methods and tools for stalk-cutting, transporting and curing burley plants.

n Staehelin, M.
Reaction of tobacco mosaic virus nucleic acid with formaldehyde.
Biochem. biophys. Acta, 1958, **29**: 410-17, bibl. 13.
Studies on inactivation of the infectivity of the nucleic acid from TMV and of intact TMV.

o Todd, F. A., and Bennett, R. R.
Cropping systems for nematode control and tobacco production.
Ext. Circ. N.C. agric. Ext. Serv. **409**, 1957, pp. 16, illus.
Two-, three- and four-year rotations which include nematode resistant crops.

p Valleau, W. D.
Variegation D—a dominant mutation in burley tobacco.
Tobacco, N.Y., 1958, **146** (23): 20-2, bibl. 1, illus.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Condiment and spice plants.

3857. Abraham, P.
New knowledge for cardamom growers.
Indian Fmg, 1958, **8** (2): 34-8, illus.

Owing to the transmission of mosaic disease by rhizome cuttings, cardamoms are best raised from seed. Seeds germinate best if sown immediately after harvest; in one experiment viability fell by 54% in 15 days and by 94% in 3½ months. Seedling production was highest when seeds were sown from December to March. A grass mulch increased germination percentage. Seed scarification by shaking with coarse sand also improved germination. Nursery beds should be shaded after the seed germinates. Seed should be sown at 80 to the sq. ft and year-old seedlings transplanted to 6-in. spacing still under nursery conditions.

3858. Lee, L. A., and Caruso, V. J.
Methods of distinguishing sources of nutmeg or mace.
J. Ass. off. agric. Chem. Wash., 1958, **41**: 446-9, bibl. 7.

Nutmeg and mace oils of East Indian origin show qualitative and quantitative differences in phenol content from oils of West Indian origin. Spectrophotometric and chromatographic methods of discovering where samples come from are described.—East reg. Res. Lab., Philadelphia, Pa.

3859. Garayar, H., and Corbera V., J.
Propagación de la pimienta. **(Propagation of pepper.)**
Bol. trim. Exp. agropec. P.C.E.A., Lima, 1957, **6** (2): 25-8, bibl. 1, illus.

Terminal cuttings produce rapidly growing plants, fruiting in 3 years. Plants from basal cuttings require 5 years to fruit and those from lateral shoots are bushy and largely unproductive. The most satisfactory shoots for rooting are those which have matured in shade and have ceased elongation through removal of the terminal bud. Cuttings 40–60 cm. long are used where material is plentiful. They are embedded for half their length, 20–40 cm. apart, with 1 or 2 leaves above the soil, in pots or nursery beds with organically rich soil in shade, and kept moist. If material is less plentiful, portions of stem with 2–3 leaves are used, the lower cut for each being 2 cm. below a node. Each end is disinfected with 15% ferbam and the base is dipped in 0·2% IBA. The exposed end (or ends) may be waxed, and the stem, particularly at the nodes, is embedded superficially in washed sawdust or prepared soil in a Trinidad-type cacao propagator, providing 95–100% R.H. and 20–30% light intensity. Rooting takes 20–30 days instead of 2–3 months. Lighting and ventilation are then increased gradually for a fortnight before transplanting into shaded nurseries. Pepper may also be soil layered by prostrating and embedding the main stem or basal shoots, leaving the leaves exposed and keeping the soil moist and shaded. After 2 months the rooted sections are cut with 2–3 leaves each for transference to nurseries. Shoots may be air-layered by binding them with damp moss inside split bamboo canes, and irrigating with nutrient solution. Rooting takes about 2 months. For propagation by seed, depulping is optional. The seeds are sown 5 cm. apart and 2–3 mm. deep in boxes of fine sand shaded by burlap. Germination begins in 35–40 days and seedlings with 2 foliage leaves are transplanted with 20 × 40 cm. spacing into pots or nurseries, where they must remain for a year before planting out.

Drug plants.

(*See also* 3903f, h, r, v, x.)

3860. Sapko, D. D.
Hybrid medicinal chenopodium. [Russian.]
Bot. Žurnal, 1958, **43**: 701-3, bibl. 2, illus.

Hybrids between tetraploid *Chenopodium anthelminticum* (♀) and diploid *C. ambrosioides* (♂) produced higher yields of fruit containing about twice as much essential oil as either parent, though taking longer to mature. This improvement was not maintained in subsequent generations; hence, to produce high yielding hybrid seed, mixed sowings of the 2 species have to be made each year.

3861. Vidal, P., and Bonnet, P.
Nouvelle méthode de détermination de la productivité du cinchona. **(A new method of measuring the productivity of cinchona.)**
J. Agric. trop. Bot. appl., 1958, **5**: 224-37, bibl. 5.

A formula is developed for estimating the quantity of quinine sulphate in an unharvested plantation from sample measurements of tree dimensions and bark quality. Its accuracy is demonstrated by comparison with actual harvest results.

3862. Kalemkiarian, P. H., and Miller, O. H.
A pharmacognostical study of *Datura discolor* Bernh.
J. Amer. pharm. Ass., sci. Ed., 1957, **46**: 393-6, from *Biol. Abstr., Sect. D*, 1958, **32**, No. 13,831.

D. discolor is commonly found in the Colorado desert of Southern California and in parts of Mexico. It is described in several keys to flora of this area, but has never been examined pharmacognostically. The historical background, distribution and growth habits of this plant are discussed. A taxonomic description is included and covers additional features not presented in previous reports. The principal microscopic characteristics are described and compared with other *Datura* species of this area. Alkaloidal content and composition of a number of samples are reported. Total alkaloid content approximates that of the official *D. stramonium*, but the mixture contains a much greater proportion of scopolamine.

3863. Liberalli, C. H., and Aisic, C.
Sôbre a composição alcoloïdica da trombeteira branca *Datura suaveolens* Hum. et Bonpl. I. Identificação dos alcoloides. **(The alkaloidal composition of *Datura suaveolens*. I. Identification of the alkaloids.)**
An. Fac. Farm. Odontol. Univ. São Paulo, 1955 (issued 1956), **13**: 67-80, illus., from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 17,471.

Analyses, mainly chromatographic, showed *Datura suaveolens* (≡*D. arborea*) to be rich in scopolamine and also to contain hyoscyamine. It is suggested that it be included in the next edition of the Brazilian Pharmacopoea as the best local source of scopolamine.

3864. Beal, J. L.
The effect of selected hormones on the alkaloidal yield of *Datura tatula* (Linné).
Diss. Abstr., 1958, **18**: 253-5, bibl. 14, being *Publ.* 23,664 of 81 pp.

The effects of several plant and animal hormones on the alkaloid content of *Datura tatula* were observed, and naphthoxyacetic asid, diethylstilbestrol and zinc insulin were selected for further study. Diethylstilbestrol did not appreciably affect alkaloid percentages in treated plants; there was no difference in dry weights between treated and control plants. At the fruiting stage leaves and stems of plants treated with naphthoxyacetic acid contained a significantly higher alkaloid percentage than control plants. Dry weights were higher in the control plants than in plants treated with naphthoxyacetic acid. Zinc insulin treatment caused an initial decrease in the alkaloid percentage of leaves, but at the fruiting stage alkaloid percentages were significantly higher than in control plants.—Ohio St. Univ.

3865. WASICKY, R.
Deianira nervosa Chamisso et Schlechtendal, um sucedáneo de pleno valor da *Centáurea minor.* (**Deianira nervosa, a potent substitute for *Centaurea minor*.**)
An. Fac. Farm. Odontol. Univ. São Paulo, 1955 (issued 1956), **13**: 49-61, illus., from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 21,082.

In Brazil species of *Deianira* are often used as a substitute for centaury. The general habit of *D. nervosa* is described, together with anatomical details of its stem, leaf and flower. Analyses show that the extract obtained from *D. nervosa* is more potent than that obtained from *C. minor*. The flowering tops yielded most of the drug extracted.

3866. CABO TORRES, J., AND DELSO GIMENO, J. L.
Estudios sobre digitales cultivadas. 1. Nota previa acerca de la influencia en la actividad biológica de la *D. purpurea, D. thapsi* y *D. lanata* del cultivo al sol, y a la sombra, de la hora de recolección y del procedimiento de desecación. (**Studies on cultivated foxgloves. 1. Preliminary note on the effects of growing in sun and shade, time of day for harvesting, and method of drying, on the biological activity of *Digitalis purpurea, D. thapsi* and *D. lanata*.**)
Farmacognosia, 1958, **18**: 89-99, bibl. 5.

When dried in a current of air at 80° C., leaves of *D. purpurea* contained only $\frac{1}{2}$ to $\frac{4}{5}$ as much cardiotoxic principle as those of *D. thapsi* and generally $\frac{1}{2}$ as much as those of *D. lanata*. This principle was considerably more abundant in plants grown in the sun than in plants grown in shade and, except in *D. purpurea*, increased markedly between 8 a.m. and noon. In general, drying at 80° C. gave no better results than drying in unheated air.

3867. BATTERSBY, A. R., AND HARPER, B. J. T.
Biogenesis of morphine.
LEETE, E.
Biogenesis of morphine.
Chem. Ind. Lond., 1958, No. 12, p. 364, bibl. 4, and 1958, No. 31, pp. 977-8, bibl. 7.

In independent experiments at the Universities of Bristol and California plants of *Papaver somniferum* were fed with tyrosine labelled with C^{14}. In both cases the specific activity of the morphine extracted from them showed tyrosine to be an efficient precursor. Labelled phenylalanine fed in the same way resulted in much lower incorporation, which suggests that this compound undergoes hydroxylation before transformation into morphine.

3868. BOGDAŠEVSKAJA, O. V.
Biosynthesis of morphine in poppy (*Papaver somniferum*) and its movement in the plant.
[Russian.]
Fiziol. Rast., 1958, **5**: 185-7, bibl. 8.

Of 3 amino acids introduced into poppy plants lysine increased the alkaloid content while glycine and glutamic acid reduced it. The greatest increase of morphine in the lysine-treated plants occurred in the rapidly growing organs, i.e. buds and roots, whereas the content of the leaves and stems remained practically unaltered. Morphine increased in the leaves from 4 a.m. to 9 a.m., and thereafter the milky sap exuding from the cut stem became richer owing to transfer from the leaves.

3869. KIDD, D. A. A.
Alkaloids of *Rauwolfia* species. Part IV. *Rauwolfia cambodiana* Pierre.
J. chem. Soc. Lond., 1958, pp. 2432-4, bibl. 9.

The greater part of the alkaloids found in the roots of *R. cambodiana* were present in the weakly basic fraction. The fraction amounted to 3·4% of powdered root with a moisture content of 11%. The reserpine content, however, was only 0·01%. Two other alkaloids were present in this fraction, the main one being identified as *iso*reserpiline. [A preliminary report was noted in *H.A.*, 27: 3712m.]—May & Baker Ltd., Dagenham, Essex.

3870. DE TOLEDO, T. A. N., AND GROTTA, A. S.
Descrição farmacognóstica da raiz de *Rauwolfia sellowii* Muell e Argov. e comparação com dados de outras espécies do mesmo gênero. (**A pharmacognostic description of the root of *Rauwolfia sellowii* and a comparison with similar data on other species of the same genus.**)
An. Fac. Farm. Odontol. Univ. São Paulo, 1955 (issued 1956), **13**: 41-8, illus., from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 21,075.

The microscopic anatomy of the root of *Rauwolfia sellowii* is given in detail, and a table comparing similar sections of the roots of *R. serpentina, R. canescens, R. vomitoria, R. micrantha* and *R. sellowii* is presented.

3871. BADHWAR, R. L., AND OTHERS.
***Rauwolfia serpentina*: methods of propagation and their effects on root production.**
Indian For. Leafl. **158**, 1957, pp. 7, from abstr. in *J. Sci. Food Agric.*, 1958, **9**: i-248.

The extent of root production was studied in 2-year-old plants of *R. serpentina* propagated by various methods. Root production of plants raised from seed was 4·8 times that of plants raised from stem cuttings, and 3·6 times that of plants raised from root cuttings. Thus commercial plantations for root production are best raised from seed. The total alkaloid content of 2-year-old roots was well above I.P. and B.P.C. standards.

3872. MEENAKSHI, S.
This wonder drug, *Rauwolfia*.
Indian Fmg, 1958, **8** (2): 16, 40, illus.

R. serpentina needs a hot, humid climate and a deep sandy loam. Shade is helpful when irrigation is not available. Plants grown from seed produce $6\frac{1}{2}$ times as much root as those grown from stem cuttings and $3\frac{1}{2}$ times as much as those grown from root cuttings. Seed may show 30–33% germination and 5 lb. is used in a $\frac{1}{20}$-acre nursery to supply plants for 1 acre at 1 ft × 2 ft spacing. Seed can be stored for 6 months in tins. Vegetative propagation by cuttings produces early bearing seed-bearers. The crop is harvested after 2 or 3 years, producing 2,000–3,000 lb. of dry roots per acre according to age and whether irrigated or not.

3873. Piringer, A. A., Downs, R. J., and Borthwick, H. A.
Effects of photoperiods on *Rauvolfia*.
Amer. J. Bot., 1958, **45**: 323-6, bibl. 4, illus.

Seedlings of *Rauvolfia vomitoria* were subjected to various photoperiods. At the end of 39 weeks of treatment the plants had not flowered but had exhibited striking growth responses to photoperiod. Verticillate branching at about the 18th node of the main stem was generally characteristic of the plants tested. Height of plants to this point of primary branching was greater in long days because of greater internode lengths. Branching of the main stem was presaged by a bifurcate-tip leaf condition at nodes immediately below the point of branching. The time and extent of primary and succeeding branching were functions of photoperiod, in that the longer the photoperiod the earlier the branching. Plants in 16-hr days showed secondary verticillate branching, while plants in 8-hr days remained unbranched. [From authors' summary.]—U.S.D.A., Plant Ind. Stat., Beltsville, Md.

Essential oils.

(*See also* 3856j, 3903c, k, t, w.)

3874. Gluščenko, N. N.
Coriander selection. [Russian.]
Krat. Otčet o nauč.-issled. Rab. Vses. n.-i. In-ta maslič. i efiromaslič. Kul'tur VASHNIL za 1955, Krasnodar, 1956, pp. 66-8, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 78,353.

Certain seedlings obtained from coriander plants grafted on fennel showed an increased essential oil content, exceeding the standard by 15–28%. The seeds of the vegetative hybrids contained 1·62–1·74% essential oil on a dry weight basis.

3875. Hotin, A. A.
The effect of nutrition on the essential oil accumulation in peppermint. [Russian.]
Krat. Otčet. o nauč.-issled. Rab. Vses. n.-i. In-ta maslič. i efiromaslič. Kul'tur VASHNIL za 1955, Krasnodar, 1956, pp. 207-12, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 78,352.

N and P applied during bud formation increased the menthol content of the essential oil in the leaves. Removal of the buds also increased the menthol content of the oil. In the essential oil of the inflorescence menthofuran was found, the content of which was increased by N, P and K applied at the bud stage.

3876. Pesante, A.
Prove orientative di lotta contro la verticilliosi della menta con l'impiego di preparati acuprici. (**Preliminary tests on control of *Verticillium* wilt in mint by means of non-copper preparations.**)
Not. Mal. Piante, 1958, Nos. 43/44, pp. 236-9.

Soil treatments against *V. albo-atrum* were carried out with various fungicides and fumigants, including organic mercury compounds, DNOC, chlorinated nitrobenzol, zineb, TMTD, chinosol, formalin, chloropicrin, DD and Vapam. The best results were given by chloropicrin, applied as 3 c.c. injections spaced 30×30 cm. Vapam and DD controlled the disease to a promising extent, but DD was slightly toxic to the mint. Formalin was ineffective.

3877. Holubek, J., and Kroulik, B.
Die Verteilung des ätherischen Öls und des Citrals in *Nepeta cataria* L. var. *citriodora* Balbis und der Einfluss verschiedener Trocknungsarten auf den Gehalt dieser Stoffe in der Droge. (**The distribution of volatile oil and of citral in *Nepeta cataria* var. *citriodora* and the influence of various drying methods on the content of these substances in the drug.**)
Pharmazie, 1957, **12**: 52-4, bibl. 9, from *Biol. Abstr., Sect. D*, 1958, **32**, No. 13,829.

The highest content of volatile oil and of citral occurred in the buds; at a later stage the highest content was found in the flowers with the lowest in the stem. (At the bud stage the average volatile oil content ran: stems 0·15%, leaves 1·53%, buds 2·62%; at the flowering stage, stems 0·089%, leaves 1·48%, flowers 2·07%; all based on ml. per 100 g. dry weight.) In practice, it is customary to distil the oil from the fresh entire plant. In all types of drying tried, there were always losses of oil and citral. The lowest loss was noted when drying with infra-red rays set at a distance of 70 cm.—Res. Inst. med. Plants, Prague.

Fibres.

(*See also* 3600, 3903a, e, i, l, n, z.)

3878. Lock, G. W.
Notes on fibre agaves.
Kenya Sisal Bd Bull., 1957, No. 22, pp. 16-17, bibl. 7.

Agave sisalana, *A. fourcroydes*, *A. cantala*, *A. amaniensis* and other agaves are described, with notes on a trial to compare the above-named species. *A. fourcroydes* yielded the most fibre, but over a long period *A. sisalana* proved the most suitable for E. Africa.

Hops.

(*See also* 3903g.)

3879. Häckl, R.
Der Hopfen. (**The hop.**)
Deutscher Bauernverlag, Berlin, 1955, 8½ × 5½ in., pp. 136, bibl. 16, illus., DM. 8.
Klitsch, C., Rietzel, P., and Diessl, G.
Die Technik des Hopfenbaues. (**The technique of hop growing.**)
Neumann Verlag, Weimar, 1956, 8½ × 5½ in., pp. 106, bibl. 6, illus., DM. 3.

These two small, but useful, books cover the same ground in describing all aspects of hop growing in East Germany from soil preparation before planting to drying. The methods described are similar to those used in England, except that, according to both sources, picking is still almost entirely done by hand. Both books are liberally illustrated, machines, tools and other equipment being prominently featured.

3880. Miller, R. H.
Morphology of *Humulus lupulus*. 1. Developmental anatomy of the primary root.
Amer. J. Bot., 1958, **45**: 418-31, bibl. 28, illus.

This paper initiates a series of investigations on the vegetative anatomy and morphology of *Humulus lupulus*. A brief description of the plant is given prior to the investigation of primary root histogenesis. An examination of the apical meristems of 19 seedling hop roots indicates that there is no clear-cut differentiation of the root initials into discrete cells which give rise to the various tissue regions of the primary root. Thus the developing central cylinder, cortex, epidermis and rootcap cannot be traced to separate initials, but instead arise from a common set of poorly-defined initials located a short distance behind the physical apex of the primary root. The protoderm arises from the same initials as the rootcap, so that the two have a common origin. The meristematic central cylinder shows an early cytologic differentiation and is distinctly set off from the immature cortex almost immediately behind the initials region. The primary root is typically diarch; triarch roots are uncommon. The protophloem, devoid of companion cells, first becomes discernible at approximately 300 μ above the initials region. All metaphloem sieve-tube elements appear to possess closely attendant companion cells prior to completion of primary growth. A thin-walled, uniseriate endodermis first becomes clearly demarcated at about the time that the protophloem reaches maturation. The first elements of the protoxylem appear to be tracheids. The metaxylem reaches maturity and secondary wall formation is completed before a vascular cambium becomes active. [Author's summary.]—Univ. Nevada, Reno.

3881. Srp, A.
Vliv klimatických činitelů na výnos chmele.
(Effect of climatic conditions on hop yields.)
Chmelařství, 1958, **31**: 12-13.

The total temperature requirement of hops in Czechoslovakia is 2,000–2,800° C. The total light requirement is estimated to be 1,500–1,700 hours, though in fact the number of hours of direct insolation is much lower. An examination of meteorological data for 1954 to 1956 has shown that, with similar rainfalls, yields were highest in 1955 when temperature and light conditions were closest to the optimum.

3882. Petrlík, Z., and Štys, Z.
Výsledky polních pokusů s postřiky proti peronospoře. **(Results of field experiments on spraying against hop downy mildew.)**
Chmelařství, 1958, **31**: 28-9, illus.

Results with copper fungicides against downy mildew [*Pseudoperonospora humuli*] in 1957 were similar to those obtained earlier [see *H.A.*, 28: 1645], 1% Kuprikol being the most satisfactory compound. Of 2 organic fungicides, which were also tested, zineb at 0·316% showed considerable promise.

3883. Kříž, J.
Skušenosti s hubením housenek šedavky luční. **(Experiments on the control of the caterpillars of *Hydraecia micacea* [on hops].)**
Chmelařství, 1958, **31**: 43-4, illus.

In earlier work BHC dust treatments against *H. micacea* did not come up to expectations [see also *H.A.*, 27: 2651]. In May 1957 watering the plants with insecticides was tried. Systemics and several other compounds were found unsatisfactory, but preparations based on the gamma isomer of BHC (lindane), such as Hexacid at 0·2%, Nexit at 0·15% and Verindal at 0·01%, gave over 90% control when applied at 1 l. per plant.

3884. Darling, H. S.
Systemic insecticides and the ratio of green to dried hops.
Nature, 1958, **181**: 1811, bibl. 2.

A survey of 5 hop farms in East Kent showed that the bushel/cwt. ratio (the number of bushels of green hops required to give 1 cwt. dried hops) has increased significantly from 91 in the period 1942–49 to 104 in the period 1950–57. The average rainfall during August–September also increased from 3·87 in. to 6·52 in. for the same 2 periods, but it was shown that no correlation existed between rainfall and bushel/cwt. ratio within either of the 2 periods studied. Data for individual farms showed that the increase in bushel/cwt. ratio generally coincided with the introduction to hop gardens of systemic insecticides for aphis and red spider control. It is suggested that the use of systemics may have resulted in the crop being picked in a more succulent condition, or that the presence of these compounds in the plant may have physiological side effects causing an increase in this ratio.—Wye Coll., Kent.

3885. Spetsig, L. O., Steninger, M., and Brohult, S.
The resolution of hop bitter substances by reversed-phase partition chromatography.
[French and German summaries 11 lines each.]
Proc. eur. Brewery Conv., Copenhagen, 1957, 1957, pp. 22-6, bibl. 6.

The reversed-phase partition chromatography method has proved to be a valuable tool for the resolution of some groups of bitter substances, e.g. the humulones. [An earlier account of this method was noted in *H.A.*, 27: 670 l.] The gradient elution technique makes it possible to handle a very heterogeneous material in one operation. A combination of these two techniques permits an extensive resolution of the complicated mixture of substances which form the bitter principle in hops. This paper gives a brief description of the method and the apparatus, which is equipped with a recording spectrophotometer. The method has been tried out on bitter substances from different sources, e.g. hops and beer. The resulting chromatographic patterns show the existence of a number of substances. Some preliminary investigations on their characteristics and properties have been made. The results are discussed with special regard to the brewing behaviour of the bitter substances. [Authors' summary.]—Forskningslab. LKB, Äppelviken, Sweden.

3886. Fang, S. C., and Bullis, D. E.
Study of biogenesis of humulone and lupulone in hops during ripening using isotopic carbon.
[French, Spanish and German summaries ½ p. each.]
Wallerstein Lab. Commun., 1958, **21**: 107-14, bibl. 10.

Isotopic carbon was used to study the biosyntheses of humulone and lupulone in hops during ripening. An atmosphere of radioactive carbon dioxide, generated from $BaC^{14}O_3$ inside a closed system, provided the isotope, whose rate and extent of incorporation were measured. From the specific activity (radioactivity per unit weight) and the per cent ratios of the three components of the humulone complex as obtained by countercurrent distribution, the relative biosynthesis of any one component may be calculated. Less than 3% of the C^{14} fixed was incorporated into the soft resins. Total incorporation was highest in the sample picked earliest in the season and decreased as the hops matured. Both humulone and lupulone appeared simultaneously. The rate of synthesis of humulone was approximately twice that of lupulone. In overmature hops no synthesis of cohumulone and adhumulone was observed, and humulone synthesis was reduced considerably. [Authors' summary.]—Ore. St. Coll., Corvallis.

3887. Rigby, F. L., and Bethune, J. L.
The aromatic constituents of hops. III. Analysis of the 1956 crop.
Proc. Amer. Soc. brew. Chem., 1957, pp. 66-9, from abstrs in *J. Inst. Brew.*, 1958, **64**: 253 and in *Wallerstein Lab. Commun.*, 1958, **21**: 158-9.

The procedures used for analyses of oil and α-acid fractions are described. In 24 hop varieties, representing Canadian, American, Australian and European types, total oil ranged from 0·24 to 1·76%, and 14 compounds were separated, of which 5 have been tentatively identified as myrcene, methylnonyl ketone, β-caryophyllene, humulene and γ-caryophyllene. There were considerable variations in the proportions of these oil constituents in samples from the different regions. In 22 of the varieties the α-acid content ranged from 3·6 to 8·2%, and the proportion of cohumulone therein from 22 to 43%. A highly significant correlation was found to exist between the myrcene content of the oil and the cohumulone fraction of the α acids, and also between the humulene content of the oil and the sum of the humulone and adhumulone fractions. [See also *H.A.*, 27: 2648.]

3888. Howard, G. A., and Slater, C. A.
Effect of ripeness and drying of hops on the essential oil.
J. Inst. Brew., 1958, **64**: 234-7, bibl. 4.

The examination of undried Fuggles hops picked at intervals throughout the ripening period revealed that the total oil content of the samples rose throughout ripening, the production of hydrocarbons far exceeding that of the oxygenated compounds. The amounts of both myrcene and humulene increased, but, whereas the proportion of myrcene in the hydrocarbon fraction of the oil rose, that of humulene fell throughout. The composition of the oxygenated fraction of the oil showed little apparent change. The drying of hops always reduced the amount of essential oil, usually without noticeably affecting its composition. Occasionally, however, drying caused a change in composition suggesting the occurrence of oxidation. [Authors' abstract.]—Brew. Ind. Res. Found., Nutfield, Surrey.

3889. Harris, G., and Ricketts, R. W.
Flavonoid compounds of hops and malt concerned in the formation of beer hazes.
Chem. Ind. Lond., 1958, No. 23, pp. 686-7, bibl. 8.

The polyphenols of hop cones consist of a much more complex mixture than those of malt. Chromatograms of fresh hop extracts have indicated the presence of at least 5 "leucoanthocyanins" and 2 catechins.—Brew. Ind. Res. Found., Nutfield.

3890. Drexler, O.
Zkušenosti na sušárnách v roce 1957. **(Observations on kilns in 1957.)**
Chmelařství, 1958, **31**: 10, illus.

It was confirmed that kilns function best when for every square metre of drying floor space 0·16 sq. m. of air inflow aperture and 0·60 sq. m. of air outflow aperture are provided. When the air velocity is 5–8 cm./sec. the maximum depth of the layer of hops should be 8–10 cm., when it is 8–12 cm./sec. 10–12 cm., and when it is 12–20 cm./sec. 20 cm.

3891. Bailey, P. H.
Hop drying investigations. II. Performance of improved kilns and continuous driers.
[French, German and Spanish summaries, each about 10 lines.]
J. agric. Engng Res., 1958, **3**: 108-20, bibl. 10, illus.

The economic requirements for improved methods of drying hops are examined. The results of tests on a two-deck kiln, a five-band counterflow continuous drier, and a grass drier, temporarily modified for drying hops, are reported. Direct comparison of these drying methods with conventional 20 ft square kilns is qualified by the varying stages of development of each system. [Author's abstract. For part I, see *H.A.*, 28: 2816.] The driers tested are described with the aid of plans.

3892. Bailey, P. H.
Hop drying investigations. III. Some properties of hops relating to the drying process.
[French, German and Spanish summaries 7–8 lines each.]
J. agric. Engng Res., 1958, **3**: 226-34, bibl. 12.

Experiments are described on the effects of wet-bulb temperature on the quality of three hop varieties dried in Wye miniature kilns. The use of wet-bulb temperatures 8–11° F. higher than normal did not appear to have any marked effect apart from a deterioration in aroma in some cases. Investigations are also reported on the following mechanical properties of hops: (1) bulk density, (2) the entrainment velocity of whole cones and separated bracts, and (3) the resistance of beds of hops to airflow.

Insecticidal plants.

(*See also* 3903s, 3904c.)

3893. Levy, L. W., and Usubillaga, A.
Experimentos de bíosintesis de piretrinas radioactivas. **(Experiments on the biosynthesis of radioactive pyrethrins.)**
Bol. Inf. cient. nac., Quito, 1957, **9** (82): 42-9, from *Biol. Abstr., Sect. D*, 1958, **32**, No. 13,833.

Pyrethrum plants were grown in an atmosphere of carbon dioxide containing C^{14} for a period of 12 days. An amount of 500 microcuries of C^{14} was given to each of 2 plants, enclosed in hermetically sealed chambers. In this way the plants grew in an atmosphere initially containing 68 microcuries per mg. of total carbon. The plants were illuminated either by sunlight or by fluorescent lamps (in the night) during 228 hours. At the end of the experiment 35 g. of flowers were harvested and dried, giving 5·75 g. of dry material which was extracted with petroleum ether. The solvent was evaporated at low temperature and the solvent-free residue dissolved in 3 ml. of kerosine. The resulting extract had an activity of 360,000 counts per minute per ml.

3894. Katsuda, Y., and Tikamoto, T.
Studies on the degradation of pyrethrins. Part IV. [Japanese, with English summary 16 lines.]
Botyu-Kagaku, 1958, **23**: 60-3, bibl. 7.

Using paper chromatography it has been shown that dried pyrethrum flowers of the Hokkaido strain contain about 0·06% tiglic acid. During analysis tiglic acid behaves in much the same way as chrysanthemic acid and thus escapes detection by the usual analytical methods. This leads to a serious error in the estimation of pyrethrins I.—Res. Lab., Dainippon Jotyugiku Co. Ltd. J.R.L.

Rubber plants.

3895. Leonova, T. G.
The time of initiation of gutta vessels in *Euonymus verrucosa, E. europaea* and *E. maakii*. [Russian.]
Bot. Žurnal, 1958, **43**: 430-3, bibl. 5, illus.

Gutta vessels in spindle trees are initiated very early, i.e. during the first month of growth. They are formed in the bast of the roots and stems, being most abundant in the former. In the 3 species studied the amount and earliness of gutta vessel formation was inversely related to top and root growth. *E. verrucosa* showed the greatest, and *E. maakii* the smallest, gutta vessel development.

3896. Knjazeva, L. A.
The formation of gutta in young roots of *Euonymus europaea*. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **119**: 602-5, bibl. 7, illus.

Gutta occurs in all roots of *E. europaea*, and is an indispensable product of metabolism in the species, accumulating in varying amounts in the bast. The branching and anatomy of the roots are described.

Seed oils.

(*See also* 3697, 3903u, 3904e, 3932, 4200j.)

3897. González Gómez, C., Gallego y Gómez, F., and Swiatopolk-Mirski, A.
Acerca del aceite de semillas de *Asclepias*. (**Oil from seeds of *Asclepias*.** [French and English summaries ½ p. each.]
Farmacognosia, 1958, **18**: 83-8, bibl. 8.

Asclepias syriaca in trial cultivation in Spain yielded 853 kg. of seed per ha., with a content of semi-drying oil about 20%, the properties of which are listed.

3898. Weiling, F., and Schagen, R.
Über die Ursachen des Auftretens tauber Samen bei Ölkürbis (*Cucurbita pepo* L.). **(Causes of the occurrence of sterile seeds in the oil pumpkin.)**
Gartenbauwiss., 1958, **23**: 87-101, bibl. 11, illus.

Two types of fruit have been identified according to the distribution of sterile seeds. The main cause of sterility is considered to be physiological, both manuring and climatic conditions playing a part, but genetical factors are also of some importance.—Inst. Landw. Bot., Univ. Bonn.

3899. Pontovič, V. É., and Pinčuk, L. M.
The volatile acid content of oil poppy fruits. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **120**: 585-7, bibl. 11.

Acetic acid is the main volatile organic acid in oil poppy fruits, formic acid occurring only at certain periods and in small quantity. The rate of formation and accumulation of acids in the fruit (outer wall, placenta, seed) and leaf varies during development, being at a maximum in the fruit wall and particularly in the placenta when oil is being synthesized most rapidly. It is suggested that the acetic acid in the placenta is used by the seeds for oil synthesis.

3900. Raymond, W. D., and Ward, J. B.
Studies on illipe nuts from Sarawak and the Federation of Malaya.
Colon. Plant Anim. Prod., 1956 (issued 1958), **6**: 243-54, illus.

Nuts of five species of *Shorea* from Sarawak compared unfavourably in fat content with black Pontianak kernels from Borneo. The Malayan samples, of *Shorea gysbertsiana*, had been prepared in different ways, but this had little effect on their composition. The contents of fats, with their constants and fatty acid composition, are tabulated. The leaves and nuts of the *Shorea* species examined are illustrated.

Sundry plants.

(*See also* 3903b, d, j, m, o-q, y, 3904a, b, d.)

3901. Scholz-Günther, E.
Gall midges occurring as pests on purple willows.
Höfchen Briefe (English edition), 1957, **10**: 289-92, illus.

In the lower Rhine area both *Rhabdophaga rosaria* and other *Rhabdophaga* spp. were a serious pest of osiers (*Salix purpurea*). While parathion did not penetrate the galls, 0·1% Dipterex emulsion at 600 l./ha. completely eradicated the larvae of *R. rosaria*. Larvae of other *Rhabdophaga* spp. present in the shoots were not controlled by either product. Directed sprays of Dipterex carried out during the flight period of the midges, 8–10 days before the larval treatment should, however, give satisfactory results. A further Dipterex spray should be applied at the end of June to control the second larval generation of *R. rosaria*.

3902. Guile, C. T.
Button top midge in willows.
Plant Path., 1958, **7**: 50-1, bibl. 1, illus.

In a commercial plantation of the almond willow, *Salix triandra,* grown for basket making, 4 applications of DDT, crude BHC, dieldrin and metasystox were equally effective in controlling the midge *Rhabdophaga heterobia.* Control of first-generation midge attack, with at least 3 early sprays during the first half of May, resulted in unchecked growth of rods, which thus became less susceptible to attack by second-generation midges in July.—N.A.A.S., Derby.

Noted.

3903.

a Andes, B. C.
Notes on the effect of pressure of knives of abaca spindle machines on recovery and quality of fiber.
Philipp. J. Agric., 1955 (issued 1958), **20**: 225-32, bibl. 2, illus.
The optimum pressure observed in this test was 2,900 p.s.i.

b Anon.
Turmeric gets dressed up for the market.
Indian Fmg, 1958, **8** (1): 39-40.
Harvesting, curing, polishing and colouring.

c Blažek, Z., and Suchár, A.
Über die Möglichkeit der Aufnahme der Krautdrogen von *Melissa officinalis* L., *Mentha piperita* L. und *Salvia officinalis* L. an Stelle der Blattdrogen in die Arzneibücher. **(On the possibility of accepting drugs of the whole plant tops of *Melissa officinalis, Mentha piperita* and *Salvia officinalis* in place of leaf drugs in the pharmacopeias.)**
Pharmazie, 1956, **11**: 671-7, from *Biol. Abstr., Sect. D*, 1958, **32**, No. 13,817.
Data on essential oil contents of whole plants and leaves compared at different growth stages.

d Bond, G., and Montserrat, P.
Root nodules of *Coriaria.*
Nature, 1958, **182**: 474-5, bibl. 9.
On *C. myrtifolia*, a non-leguminous tannin plant.

e Commonwealth Economic Committee.
Industrial fibres.
[*Publ.*] *Commonw. econ. Cttee*, 1958, pp. 212, H.M.S.O., London, 5s.
A review of production, trade and consumption, including sisal, coir and kapok.

f Copet, A., and Jammar, M.
Calculateur pour l'établissement de la teneur en quinine d'une écorce de quinquina. **(Calculator for the determination of the quinine content of cinchona bark.)** [Flemish summary 6 lines.]
Bull. agric. Congo belge, 1958, **49**: 483-5, bibl. 4, illus.
A slide-rule to facilitate calculation in the tartrate method.

g Diessl, G.
Pflücke und Trocknung des Hopfens. **(Picking and drying of hops.)**
Reprinted from *Dtsch. Landw., Berl.*, 1957, No. 8, pp. 2.
Factors affecting brewing quality are discussed.

h Evans, W. C., and Wellendorf, M.
(—)-3α: 6β-Ditigloyloxytropane, a new alkaloid, from the roots of *Datura.*
J. chem. Soc. Lond., 1958, pp. 1991-3, bibl. 11.
From *D. innoxia* and *D. stramonium.*

i Garrido, T. G.
Progress report on kapok breeding.
Philipp. J. Agric., 1955 (issued 1958), **20**: 233-67, bibl. 15, illus.
Details of the F_2 generation of a local × improved Javanese strain cross.

j Hay, W. D.
Safflower production in southern Alberta.
From abstr. in *Agric. Inst. Rev.*, 1958, **13** (3): 30.
Promising prospects.

k Jennen, A.
Valorisation de l'essence d'*Eucalyptus dives* par transformation de pipéritone en thymol. **(Increasing the value of the essential oil of *E. dives* by the conversion of piperitone into thymol.)** [With Flemish summary 1¼ p.]
Bull. agric. Congo belge, 1958, **49**: 487-507, bibl. 49, illus.

l Kundu, B. C.
Ramie fibre and its development in India.
Sci. and Cult., 1958, **23**: 461-70, bibl. 32, illus.
History, distribution, cultivation methods, decortication machines, characteristics and uses of the fibre.

m Litvinov, M. A., and Rassadina, K. A.
Experimental study of the antibiotic properties of lichens indigenous to the U.S.S.R. [Russian.]
Bot. Žurnal, 1958, **43**: 557-60, bibl. 4.

n Lock, G. W.
Factors affecting fibre yields.
Kenya Sisal Bd Bull., 1957, No. 21, pp. 21-4, illus.
A review of sisal investigations.

o Ménager, H.
L'*Acacia mollissima. Acacia mollissima.*
Bull. Soc. Hort. Maroc, 1958, **45**: 509-11, bibl. 1.
Advice on establishing wattle in Morocco.

p Merendi, A.
La quercia sughera (*Quercus suber* L.). **(The cork oak, *Quercus suber.***
Ital. agric., 1958, **95**: 362-79, bibl. 12, illus.

with DNOC, hydroquinone, penicillin, terramycin, benzoic acid, methyl-p-oxybenzoic acid or umbelliferone, but was partially controlled by 8-oxyquinoline sulphate injected into trunks at 3·5–5 g. per l. The fungus alone did not kill trees rapidly, but death of untreated infected trees occurred in about 30 days when they were seriously attacked by the vector *Xyleborus*.

3917. IDROBO [M.], S., AND NAUNDORF, G.
Producción de toxinas por el *Ceratostomella fimbriata* en cacao. (**Production of toxins by *Ceratostomella fimbriata* in cacao.**)
Cacao en Colomb., 1956, **5**: 37-9, bibl. 7.

The presence of toxins in cacao bark and wood infected with *Ceratostomella fimbriata* was proved by the effects of extracts on tomato leaves. Urea sprays considerably retarded death of infected trees [see previous abstract], and it is suggested that this may have been due to the counteracting effect of urea on the toxin, an effect which has previously been demonstrated in the case of *Ceratostomella ulmi* (Dutch elm disease).

3918. GARCÍA [B.], C., AND NAUNDORF, G.
Observaciones sobre los cacaotales del Río Mira, con especial referencia a la enfermedad "escoba de bruja". (**Observations on cacao plantations of the Mira region, with special reference to witches' broom disease.**)
Cacao en Colomb., 1955, **4**: 5-9.

Conditions favouring the disease are described, with suggestions for its control. including selection of propagating material, seed disinfection with mercury salts, soil disinfection with DNOC and planting of protective barriers such as bananas.

3919. NAUNDORF, G.
Nueva contribución al problema de la moniliasis en cacao y su represión. (**Further contribution to the problem of monilia pod rot in cacao and its control.**)
Cacao en Colomb., 1955, **4**: 11-14, bibl. 3.

In a preliminary experiment, highly promising control was achieved in 10 weeks by 3 spray treatments of trees with a mixture of 1·5 kg. of a cuprous oxide product with 250 g. of a BHC product per 400 trees. [For earlier work see *H.A.*, 25: 4366.]

3920. SEPÚLVEDA LOZANO, R.
Biología del *Mecistorhinus tripterus* F. (Hem. Pentatomidae) y su posible influencia en la transmisión de la moniliasis del cacao. (**Biology of *Mecistorhinus tripterus* (Hemiptera, Pentatomidae) and its possible role in the transmission of monilia pod rot of cacao.**) [English summary ½ p.]
Cacao en Colomb., 1955, **4**: 15-42, bibl. 12, illus.

Pods inoculated with conidia of *Monilia roreri* were 28% diseased, but when *Mecistorhinus tripterus* bugs were placed on inoculated pods infection rose to 62%. Where bugs were used without conidia no pods developed the disease.

3921. HAMMOND, P. S.
Capsid control on mature cocoa.
New Gold Coast Fmr, 1957, **1**: 109-15.

Recommendations based on 2 years' field trials for capsid control in mature cacao are the application with a knapsack mistblower of 1 pint Gammalin 20 (gamma-BHC) in 5 gal. of spray per acre, this treatment being repeated after 4 weeks. Subsequent treatment need be of localized areas only. Marked improvements in yield have been obtained after treatment. DDT was much less effective than BHC, and dust and fog applications were less effective than mistblowing.

3922. RILEY, J.
A survey of the build-up of infestation in bagged cocoa beans in store in Western Nigeria.
Bull. ent. Res., 1957, **48**: 75-8, bibl. 2.

In bagged cocoa beans stored at Ibadan the population of *Ephestia cautella* remained low throughout the period but that of *Lasioderma serricorne* increased steadily from a low level at the outset. It is estimated that, in general, it would not be safe to store initially good cocoa for more than 25 weeks during the main crop season.—W. Afr. stored Prod. Res. Unit., Ibadan.

Coconuts.

(*See also* 3996s, 3997e.)

3923. CEYLON.
Annual Report for 1955 of the Coconut Research Institute, Ceylon.
Ceylon Coconut Quart., 1956, **7**: 4-67, illus.

Work described by the following heads of departments includes: *Soil Chemist:* High N continues to cause yield depressions, but in 2 trials P has given significant increases in yield; inorganic fertilizers have given higher nut yields than have several organic fertilizers. *Chemist:* Sand culture experiments with coconut seedlings; the relation between moisture content of copra and atmospheric humidity; examination of hybrid palm copra; coir dust as mulch to control immature nutfall. *Botanist:* Studies on the dwarf palm; intraspecific hybrids; size of seed-hole and growth of coconut seedlings. *Crop Protection:* Larvae of rhinoceros beetle were killed within 4 days by D-D soil fumigant or dieldrex; its biological control is also being studied.

3924. KOYAMU, K., AND ALBUQUERQUE, S. D. S.
Hints on the age of planting and spacing of coconut seedlings.
Coconut Bull., 1957, **11**(1): 11-12, 21.

In trials at the Coconut Research Station, Pilicode, started in 1925, higher yields per tree were obtained from trees planted when 1 year old than from those planted when 2 or 3 years old. There were also indications that wide spacing resulted in higher yields than close spacing, and planting 55–57 trees per acre is recommended. Early planting and close spacing both resulted in greater susceptibility to shoot-rot disease.

Coffee.

(*See also* 3039, 3896, 3996x, y, 3997a, f, q, u, 4022, 4028.)

3925. FRAGA, C. G., JR., AND CONAGIN, A.
Delineamentos e análises de experimentos com cafeeiros. (**Lay-out and analysis of coffee experiments.**) [English summary ½ p.]
Bragantia, 1956, **15**: 177-91, bibl. 3.

Procedures adopted at the Instituto Agronômico de Campinas are described for fertilizer and variety trials, progeny tests and miscellaneous experiments. Results are quoted for spacing and planting methods, and the question of plot size for coffee experiments is discussed.

3926. BACCHI, O.
Novos ensaios sôbre a seca da semente de café ao sol. **(Further experiments on sun-drying coffee seed.)** [English summary 8 lines.]
Bragantia, 1956, **15**: 83-91, bibl. 3.

Moisture content and germination capacity were studied in seed dried in sunlight, shade and artificially over sulphuric acid. In every case viability remained unimpaired until the moisture content was reduced below 9%. Sun-drying for 34 hours and shade-drying for 17 days each left just over 10% of moisture in the seeds under climatic conditions obtaining in S. Paulo in early September. Seeds dried in the shade for 18 days subsequently withstood 8½–10 hours exposure to sunlight without significant loss of viability. Drying for 2 months over sulphuric acid was safe at R.H. 50% or higher, but at R.H. 40% there was a slight fall in viability after 1 month. [For previous paper see *H.A.*, 26: 4164.]

3927. VAN HAAREN, A. J. H.
The vegetative propagation of *Coffea arabica* L.
Papua New Guinea agric. J., 1955, **10**: 43-53, bibl. 7, illus.

Of various methods of vegetative propagation tested for arabica coffee at Aiyura, the following were most successful: (1) Single internode cuttings taken from watershoots during the dry season, and (2) cleft grafting with scions taken from the middle section of the watershoot, partially or wholly defoliated, and grafted on 1- to 2-year-old seedlings.

3928. SCARANARI, H. J.
Espaçamento das mudas de café na cova. **(Spacing of coffee seedlings in planting sites.)** [English summary ½ p.]
Bragantia, 1956, **15**: 347-52, bibl. 5.

Four 1-year-old plants raised from seed were spaced on the square 10, 20, 30 and 40 cm. apart in prepared sites each measuring 60 × 60 cm. × 50 cm. deep. Data covering the first 4 harvests show that plant height was greater from the two closer than from the two wider spacings and that yields increased in linear proportion to increase of spacing. Bean size was unaffected by spacing.

3929. DUBLIN, P.
Recherches sur la floraison et la fructification du caféier de la "Nana". **(Studies on flowering and fruiting of Nana coffee.)** [English and Spanish summaries 1 p. each.]
Agron. trop., 1957, **12**: 173-208, bibl. 57, illus.

Both morphologically and biologically Nana coffee shows marked similarities to *canephora* varieties, which suggests that it is a variety of this species. Among the many experiments described here it was found that pollen could be stored successfully for 9 months at 0–5° C. in the presence of magnesium chloride; pollen germinated readily on sugar media. Only 50% of the fertilized ovaries set fruit. In practice Nana plants appear to be completely self-sterile, although this may not be the case for all strains. Nana and Robusta were found to be completely inter-fertile.—Stat. agric. Boukoko.

3930. DE SAMPAIO BARROS, M., JR.
Sombreamento e cafés finos. **(Shading and high-quality coffee.)**
Bol. Super Serv. Café, S. Paulo, 1957, **32**(359): 60-2.

Shading with *Inga* when replanting coffee bushes and pruning at the top and base of the bush for 3 successive years from the 7th onward gave high yields of excellent quality. When shade trees began to compete with the crop this was successfully overcome by cutting a trench 40–50 cm. deep between them and the coffee bushes. Shading greatly reduced pest infestation. Red and yellow *bourbon* types were easiest to grow under shade; *caturra* types needed more light and heat.

3931. PESSANHA, M.
Contribuição para o estudo da relação entre a chuva e a produção do *Coffea canephora* Pierre. **(A contribution to the study of the relationship between rainfall and productivity of *Coffea canephora*.)** [French and English summaries 8 and 9 lines respectively.]
Agron. angol., 1956, No. 10, pp. 9-14, bibl. 5.

Data obtained during the period 1947–55 at the Central Agricultural Station, Cazengo, although insufficient for statistical treatment, suggested that there was a correlation between average yield of fresh coffee beans per tree and amount of rainfall in the previous season.

3932. JONES, P. A., AND WALLIS, J. A. N.
Irrigation experiments at the Coffee Research Station, Ruiru, Kenya.
E. Afr. agric. J., 1957, **22**: 186-7, bibl. 3, reprinted in *Mon. Bull. Coffee Bd Kenya*, 1957, **22**: 68, bibl. 3.

The lay-out of a long term factorial experiment to test the effect of applying irrigation at 4 different times by 2 methods on the vegetative growth, flowering, crop yield, pests and diseases of mature multiple stemmed coffee is described.—Dep. Agric., Kenya. J.R.L.

3933. PEREIRA, H. C.
The seasonal assessment of water needs in the irrigation of coffee.
E. Afr. agric. J., 1957, **22**: 188-93, bibl. 4, reprinted in *Mon. Bull. Coffee Bd Kenya*, 1957, **22**: 94-6, bibl. 5.

The soil moisture deficits (10-day calculations) in a plantation of arabica coffee are shown for the period 1950–56. An experiment at Ruiru has shown that when water is applied in small basins, about 4 ft. × 4 ft., the quantity needed to wet the greater part of the root zone is only about half that needed when water is applied by overhead sprinkler. Arrangements are being made, by which planters may submit rainfall data and be advised of the approximate soil moisture deficit.—E. Afr. Agric. For. Res. Org. J.R.L.

Frames were packed with peat which was separated from the ground by a plastic sheet to maintain a moisture content well above 75%. Pots containing cinerarias, cyclamen, begonias and tomato seedlings were plunged into the peat, which was watered and also supplied with a complete fertilizer solution (at 0·1% for growing plants and less for flowering plants) by sub-irrigation with a proprietary trickle hose. Labour cost was low, as watering was simplified and the lights were left undisturbed.

3911. Baumgartner, L. L.
New container mix light and uniform.
Amer. Nurserym., 1958, **107** (10): 84-5.

A 3-year study was made of various growing media for container-grown stock at Baumlanda Horticultural Research Laboratory, Croton Falls, N.Y. Among the conclusions reached were the following: Peat is essential in all mixtures, but there was no advantage in using it in quantities of more than 25% except in a perlite-peat combination where 50% peat was desirable. Sand maintained a good porous mixture for the first year but later became difficult to wet. In no case did the use of soil in a mixture improve plant growth. The most uniform mixture, producing plants with the most fibrous root systems, was a combination of peat and perlite.

3912. Reeker, R.
Veralgung der Erde eine Gefahr? **(Does algal growth constitute a danger?)**
Torfnachrichten, 1957, **8**: 11-12.

When peat is used as a potting medium for cyclamen and other plants, algal growth is encouraged. It has been demonstrated that this does not harm the plants, because the oxygen supply to the roots remains adequate even at high rates of watering.

3913. Penningsfeld, F.
Phosphorsäuremangel im Blumen- und Zierpflanzenbau. **(Phosphate deficiency in flowering plants.)**
Reprinted from *Phosphorsäure*, 1958, Vol. **18**, pp. 23, illus.

The symptoms caused by P deficiency are described in detail and illustrated in colour for the following plants grown in peat cultures: *Aechmea fasciata*, *Aphelandra squarrosa*, azalea, camellia, gardenia, chrysanthemum, cyclamen, erica, gerbera, hydrangea and rose. Greater susceptibility to infectious diseases was among the effects observed among P-deficient plants.—Inst. Bodenkde PflErnähr. Staatl. Lehr- u. ForschAnst. Gartenb. Weihenstephan.

3914. Holley, W. D., and Goldsberry, K. L.
Reflected light boosts winter plants.
Grower, 1958, **49**: 1427.

The effect of curtains of 0·007 aluminium foil laminated to 0·0007 polythene in providing extra light during the winter for flower crops has been studied. Dry matter production of snapdragons and marigolds was increased by reflected light, and flowering was accelerated by about 1 week. Quality of carnation cuttings was also improved by the reflected light.—Colo. Flower Grs' Ass.

3915. (Skilton, W. E. T.)
Somerset grower experiments with foil liners.
Comm. Gr, 1958, No. 3,260, p. 1446.

Aluminium foil was satisfactory but expensive as a box liner for cut flowers, notably lily-of-the-valley, and prevented loss of moisture. As a seed box cover it hastened germination by 3–4 days compared with glass and paper.

3916. Sherwood, C. H.
Effect of a plastic coating on cut flowers and greens.
Diss. Abstr., 1958, **18**: 19, being *Publ.* 23,471 of 56 pp.

Sprays of 10% and 20% Vinyl latex 600 reduced water loss from cut gardenia, *Asparagus plumosus* and *Polystichum munitum*. Carbon dioxide accumulation in excised rose petals coated with 10% Vinyl latex 600 was about 50% higher than in untreated petals. Slow drying of latex, when applied at levels above 10%, on plant tissues resulted in phytotoxicity and respiration abnormalities.—Mich. St. Univ.

3917. Mega, K.
Water absorption and transpiration of cut flowers. II. [In English.]
Bull. Univ. Osaka Pref., Ser. B, 1957, **7**: 15-22, bibl. 10.

Studies showed that the life of cut blooms of the tulips Pride of Haarlem, Bartigon and Inglescombe Yellow and of ox-eye daisies was not increased by using MH or α-NAA. MH caused the petals to open more rapidly than those of untreated blooms and NAA caused epinasty. Cut hydrangea flower shoots which had been partially defoliated, coated with vinyl latex (except for the flower head) and supplied with water under pressure from a 50 cm. head remained fresh, on an average, 10 days longer than untreated blooms. At low temperatures the volume of water absorbed by cut chrysanthemum shoots was found to be proportional to that transpired, but at high temperatures transpiration was increased without a corresponding increase in the volume of water absorbed. The Q value (quotient of volume of water transpired to that absorbed) increased daily during the life of the cut shoots until wilting occurred. It was demonstrated that more water is absorbed through the cut end of the stem than through the sides, and that crushing the lower 3 or 6 cm. of chrysanthemum shoots does not prolong their life. Differences in the volume of water transpired and absorbed by Shasta daisy plants were found to be due to plant variation and were not related to the number of leaves on each plant. J.R.L.

Annual and herbaceous plants.

(*See also* 3254, 3996c, f-h, l, u, 3997b, e, f, h, m.)

3918. Sakanishi, Y.
Studies on the germination behaviour of some annual and biennial flower seeds. [In English.]
Bull. Univ. Osaka Pref., Ser. B, 1957, **7**: 23-8, bibl. 4.

Ripe seeds of *Amaranthus tricolor*, *Celosia cristata* var. *childsii* and *Eschscholtzia californica* were harvested at 10-day intervals throughout the summer, and the flowers of stocks (*Matthiola incana*) were thinned, leaving ten pods to develop at various heights from the ground. Tests showed that amaranthus and celosia seeds fertilized in the hot season germinated less well than those fertilized when the weather was cooler. Seeds harvested from the upper part of the stem in late autumn did not germinate quite so well as those harvested earlier. Amaranthus seeds germinated best in the dark and celosia seeds in the light. Californian poppy seeds maturing early and late in the season germinated better than the mid-season seed, but these fluctations did not appear to be related to the climatic conditions under which the seed developed. With stocks there were only slight differences in germinating capacity, but some decrease in viability was noted in seeds borne at the top of the stem. J.R.L.

3919. HÜLSMANN, B., AND THIELE, K. P.
Schnittgrünertrag von *Asparagus sprengeri* in Hydrokultur, Einheits- und Praxiserde. **Foliage yields of *Asparagus sprengeri* grown in water culture and in two standard composts.)**
Gartenwelt, 1958, **58**: 172-3, bibl. 3.

Yields of asparagus fern over 4 years were highest in a gravel culture system, which also had the lowest constructional and running costs. The lowest yields were obtained from plants grown in one of the standard compost mixtures.

3920. BELGRAVER, W., AND OTHERS.
Amerikaanse anjers. (**Perpetual flowering carnations.)**
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 20-30, illus.

In a comparison of beds laid down for 1 or 2 years, flower production was lower, but quality was higher, in one-year beds with cuttings taken in January, than in two-year beds with cuttings taken in November. Yields of carnations given trickle irrigation with a 2% nutrient solution were 10·6% higher than those of controls (normal hose watering). Experiments comparing pumice, gravel and soil rooting media have shown that total production was best in gravel, mainly as a result of a high yield of first quality flowers. *Phialophora* was successfully controlled in beds by Vapam (100 c.c. per sq. m.). Spread of *Erwinia* was accelerated in a bed with sub-irrigation, as compared to normal hose watering. Good results have been obtained in testing cuttings for bacterial disease. Tip cuttings of 2 varieties have been propagated to obtain virus-free material.

3921. GASIORKIEWICZ, E. C.
Storage rots of carnations.
From abstr. in *Phytophthology*, 1958, **48**: 261-2.

Low-temperature conditioning of cut flowers and of rooted and unrooted carnation cuttings at 31° F. is a recent cultural development. Holding periods vary from a few days to 4 weeks for flowers and from a few days to 6 months for cuttings. The symptoms are described of a storage rot of flowers caused by *Botrytis cinerea*, a stem rot of cuttings caused by the same fungus, and a leaf rot of cuttings caused by *Alternaria dianthi*. Sprays or dips with captan or zineb have effectively controlled the storage rots of cuttings.

3922. STAHL, M.
Erfahrungen mit der Stecklingsprüfung bei Nelke und Chrysantheme. (**Experiments on methods of testing cuttings of carnations and chrysanthemums [for the presence of diseases].)**
Gartenwelt, 1958, **58**: 152-3, 169-71, bibl. 3, illus.

The author discusses the transmission of bacterial and fungus diseases by carnation cuttings, and describes American and Danish methods of testing cuttings for disease. Experience with the Danish method has indicated that its value is probably limited to large, specialist nurseries. A method of testing chrysanthemum cuttings for *Verticillium* wilt is described; it is simpler than the methods used for testing carnations, and 500 cuttings may be tested per week by one person. It is emphasized that the testing of cuttings must be followed by hygienic growing conditions.—Landesanst. Pflanzenschutz, Stuttgart.

3923. RIEHL, G.
Wuchsstoffanwendung bei unterschiedlicher Substratfeuchtigkeit zur Stecklingsvermehrung. (**The application of growth substances to cuttings propagated in media of different moisture contents.)** [Russian and English summaries 1⅓ pp. each.]
Arch. Gartenb., 1957, **5**: 265-83, bibl. 2, illus.

Tip cuttings of *Chrysanthemum indicum* and *Myrtus communis* were treated with several growth substance compounds in a study on the interdependence of individual environmental factors. The effects of treatments with identical concentrations were found to be beneficial, neutral or harmful according to the moisture content of the medium. At a low moisture level the cuttings derived the greatest advantage from the treatment, as compared with the controls, but they did not root more rapidly than untreated cuttings grown at higher moisture levels. It follows that the successful propagation of cuttings depends on a combination of conditions, which may help to explain some of the apparently contradictory results obtained in the past. [See also *H.A.*, 28: 653.]—Inst. ZierpflBau Humboldt-Univ., Berlin.

3924. RIEHL, G.
Die Luft- und Bodentemperatur in der gärtnerischen Stecklingsvermehrung bei Unterbewässerung. (**Air and soil temperature in the propagation of cuttings with subirrigation.)** [Russian and English summaries 14 and 11 lines respectively.]
Arch. Gartenb., 1957, **5**: 413-28, bibl. 8, illus.

An examination of the requirements of *Chrysanthemum indicum* cuttings showed that rooting depends on a favourable combination of various environmental factors, the best results being obtained with a soil temperature of 29° C. and an air temperature of 23° C. Additional light showed no advantage. It is suggested that the two phases, viz. root formation and the further development of the roots, should be assessed separately, since both stages make different demands on the moisture content of the substrate.—Inst. ZierpflBau Humboldt-Univ., Berlin.

3925. Mathisen, K., and Strømme, E.
Krysantemumsorterforkortdagsbehandling. **(Chrysanthemum varieties for short-day treatment.)**
Gartneryrket, 1958, **48**: 446-55, illus.

Cultural data are compiled for many varieties, mostly American, requiring a day length of about 9 hours, a temperature of about 15° C. and a growing season of 9–15 weeks.—Norwegian Coll. Agric.

3926. Box, C. O.
Experiments in production of chrysanthemums.
Miss. Fm Res., 1957, **20** (10): 7.

Five varieties of pot chrysanthemum were given 5 different photoperiod and terminal bud removal treatments. The best flower production, in terms of quality and earliness, in all the varieties resulted from supplying 10 long days after potting, followed by 10 short days and then pinching out the terminal bud.

3927. Anon.
Compact mums in prospect.
Agric. Res. Wash., 1958, **7** (1): 15.

Full-sized blossoms on very short-stemmed plants resulted from treating chrysanthemums with Amo-1618. Calliopsis, sunflowers, sesame, salvias and beans also responded to varying degrees.

3928. Brierley, P., and Smith, F. F.
Some characteristics of eight mosaic and two rosette viruses of chrysanthemum.
Plant Dis. Reptr, 1958, **42**: 752-63, bibl. 10, illus.

In transmission tests 10 chrysanthemum varieties yielded 8 mosaic and 2 rosette viruses. All but 2 of these original source varieties were found to carry their respective viruses without symptoms. The more virulent viruses were readily superimposed on the milder ones. Virus-free stock was reclaimed by heat treatment at 35° C. for 4 to 12 months from 6 of the 10 virus source varieties. The value of chrysanthemum test varieties for detecting these and other viruses is discussed.—Agric. Res. Serv., Beltsville, Md.

3929. van der Zwaard, P.
Columnea. Kortedagbehandeling. **(Short day treatment of *Columnea*.)**
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 34-5.

Plants of *Columnea banksii* were given short-day treatment for 7 weeks from the beginning of July, but no effects on bud formation, time of flowering or numbers of flowers were observed.

3930. Koek, P. C.
Gerbera. [In Dutch.]
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 49-52, illus.

Division of mother plants at the end of February has produced an average of 6 plants each and these started to flower at the end of May. Steaming gave the best results in soil infected with foot rot (*Fusarium oxysporum*), but Vapam (at 100 c.c. per sq. m.) also showed promise [see also *H.A.*, 28: 2856]. Foot rot infection was low in raised beds.

3931. Kivilaan, A., and Scheffer, R. P.
Factors affecting development of bacterial stem rot of pelargonium.
Phytopathology, 1958, **48**: 185-91, bibl. 13.

A high percentage of commercially available pelargonium stocks carry *Xanthomonas pelargonii* in a latent form. Twenty-six percent of 600 plants of 6 varieties, kept under conditions favoring disease development but precluding disease spread, developed stem rot within 3 months. *X. pelargonii* did not attack plants outside the geranium family. Disease was favoured by high temperatures; symptoms developed slowly at 10° C. night temperature, developed faster at 21°, and rapidly killed plants at 27°. Mineral nutrient levels below and above optimum for growth enhanced disease development, as did high N, high P, and low Ca. Symptoms were inhibited by high K, low P, high Ca, and balanced nutrient solution at optimum concentrations for growth. [From authors' summary.]—Mich. St. Univ., East Lansing.

3932. Borsos, O.
Kísérleti morfológiai megfigyelések mákfajtákon. **(Experimental observations on the morphology of *Papaver* species.)**
Ann. Univ. sci. budapest., Sect. Biol., 1957, **1**: 27-9, from *Hung. agric. Rev.*, 1957, **6** (4), Abstr. 276.

Following trials with 2 cultivated poppy varieties 4 species, *P. argemone*, *P. hybridum*, *P. dubium* and *P. rhoeas*, were grown in 2 seasons both with abundant irrigation and under very dry conditions. Irrigation resulted in increased stalk height and leaf size and also produced changes in characters previously regarded as constant within each species, namely the shape of the capsules and the number of loculi.

3933. Shaw, F. R., Bourne, A. I., and Migliorini, R.
The effects of various levels of fertilizers on the growth and nectar secretion of snapdragons (*Antirrhinum majus*).
Glean. Bee Cult., 1957, **85**: 598-9, from abstr. in *Bee World*, 1958, **39**: 217.

Various levels of fertilizers were fed to snapdragons under controlled conditions. Length of stems, number and size of blossoms, and amount of nectar and its sugar concentration were determined for each treatment. It was concluded that plants which received low levels of N and P and a medium level of K produced a greater quantity of nectar of lower sugar concentration. Plants which received medium levels of N and P and a low level of K gave nectar of the highest sugar concentration. Medium to low levels of N, P and K appeared to produce more nectar with higher sugar concentrations than did high levels of these chemicals.—Univ. Mass., Amherst.

3934. Schröter, H. B.
Über den Nachweis von Nikotin in der Composite *Zinnia elegans* und über die Bedeutung dieses Alkaloids für die interfamiliäre Pfropfung *Zinnia* auf *Nicotiana*. **(The presence of nicotine in the composite *Zinnia elegans* and the importance of this alkaloid in interfamily grafting of *Zinnia* on *Nicotiana*.**
Arch. Pharm., 1955, **288**: 141-5, from *Tob. Abstr.*, 1957, **1**, Abstr. 883.

Nicotine and two other alkaloids, possibly nornicotine and anabasine, were found to occur in zinnias as 1·0% and 0·03% of the fresh weight of roots and shoots, respectively. The fact that zinnia grafts develop normally on tobacco roots is attributed to their ability to synthesize nicotine translocated from the tobacco roots.

3935. Beaumont, A., Cleary, J. P., and Bant, J. H.
Control of damping-off of zinnias caused by *Alternaria zinniae*.
Plant Path., 1958, **7**: 53-4, bibl. 1.

In laboratory tests on 2 zinnia varieties dry seed treatments were more successful than wet treatments for controlling *Alternaria zinniae*. Hot-water treatment at temperatures which did not harm germination did not reduce infection appreciably. Good results were obtained with mercuric chloride solutions and dust (Ceresan) and with 50% thiram dust. Treatment with thiram dust is recommended as the most reliable and convenient method of control.—N.A.A.S., Leeds.

Bulbs, tubers, etc.

(*See also* 3227, 3264, 3571, 3596, 3597, 3761, 3763, 3996k, o, 3997a, c, g.)

3936. Gould, C. J.
The flower bulb industry.
Stats Circ. Wash. St. agric. Exp. Stats **318**, 1957, pp. 60, bibl. 56, illus.

The author in his introduction states that "the main purpose of this bulletin is to assemble the chief facts pertaining to flower bulb production in the most important producing countries, to help Washington State bulb growers chart their operations and to benefit others interested in bulb production". The crops considered in most detail are tulips, bulbous irises and daffodils, but some data are included on other crops, notably gladioli and lilies. Cultural methods, acreages and production figures are outlined for each country in turn, those receiving most attention being Canada, Japan, the Netherlands, the U.K., and the U.S.A.

3937. Steiner, A. A., and van Zon, A. Q.
Anthurium. Grind cultuur. **(*Anthurium*. Gravel culture.)**
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 30-2.

In comparisons of several growing media leaf growth and flower production of *Anthurium andraeanum* was better in gravel than in peat or than in a mixture of sphagnum and conifer forest soil. Growth differences between the media were less marked with *A. scherzerianum*, but flower production was again highest in gravel.

3938. Dänhardt, W., Sehm, E., and Clauss, B.
Einige Betrachtungen zum Vergleichsanbau bei Cyclamen. **(Some observations on comparative trials with cyclamen.)**
Der Cyclamenvergleichsanbau der Farben "Leuchtendrot" und "Dunkelrot". **(Comparative trials with the cyclamen varieties Leuchtendrot and Dunkelrot.)**
Dtsch. Gartenb., 1957, **4**: 121-4, illus., and 333-7, illus.

The characteristics by which cyclamen plants are judged as being true to type are flower colour, degree of flowering, flower size and shape, plant form, leaf markings and economic value. In the second article plants grown from seed from 50 commercial sources were compared for trueness to type, and in general the results were satisfactory.

3939. Bik, R. A., and others.
Cyclamen. [In Dutch.]
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 36-42.

Five potting composts were compared with Rosa von Zehlendorf as test variety, and little difference in growth was apparent, except with a mixture of clay and conifer forest soil, which gave poor results. *Botrytis cinerea* was controlled best by dusting with B 500 (based on a halogen-oxychinoline derivative) and by spraying with 2% griseofulvin-oxime. Attack by *Otiorrhynchus sulcatus* may be prevented by mixing 750–1,000 g. aldrin dust (2½%) with 1 cu. m. potting compost. Control of cyclamen mite was not successful with 0·1% endrin, 0·2% kelthane or 0·3% thiodan.

3940. van Bragt, J.
Chromatografisch bloemkleuronderzoek bij cyclamen. **(Chromatographic studies of cyclamen flower pigments.)** [English summary 13 lines.]
Meded. Dir. Tuinb., 1958, **21**: 341-3, bibl. 5.

It has been confirmed that cyclamen flowers are coloured by diglycosides or pentoseglycosides of delphinidin, malvidin, cyanidin and paeonidin. New data on the occurrence of these pigments in certain cultivars are discussed with reference to their significance in breeding.—Lab. Tuinbouwpl., Wageningen.

3941. Melder, A.
Fortschritte in der Bekämpfung der Wurzelbräune an Cyclamen. **(Progress in the control of root rot in cyclamen.)**
Gartenwelt, 1958, **58**: 206-7, illus.

Mixing fungicides with soil was tested as a means of controlling root rot of cyclamen, caused by *Thielavia basicola*. Captan alone was phytotoxic, but did control infection satisfactorily when used in combination with zineb or TMTD. Both these latter materials were effective when used alone. Soil-fungicide mixtures should be used when pricking out for the second time.

3942. Koek, P. C., Kragtwijk, C., and Helle, W.
Freesia. [In Dutch.]
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 45-9.

Dusting with TMTD 10% gave good control of *Botrytis*, but B 500 had a more persistent effect, and was not harmful to the flowers. Fortified oils gave good control of weeds, but rates of application should not be too high; spraying with CIPC and other growth inhibiting herbicides is not recommended. Infestations of root mite (*Rhizoglyphus echinopus*) were observed on injured corms, but were controlled by fumigation with methyl bromide.

3943. MANTROVA, E. Z.
Gladiolus nutrition. [Russian.]
Bjul. Gl. bot. Sada AN SSSR, 1956, No. 24, pp. 64-70, from *Ref. Ž.* (*Biol.*), 1957, No. 16, Abstr. 69,490.

Gladioli responded most readily to N nutrition especially when this was applied as side dressings during the development of the 2nd and 5th leaves. The effect of N was enhanced when K was also applied. Complete fertilizer in the early stages of development depressed growth but became effective after the 5th leaf stage, and the response of plants to NPK improved throughout the growth period.

3944. LEBLOND, D.
Désinfection de bulbes de glaïeul. (**Disinfection of gladiolus corms.**)
Rep. Que. Soc. Prot. Plants, 1957, 1958, **39**: 55-8.

In tests covering 5 years on the control of *Sclerotinia gladioli* and *Fusarium oxysporum* f. *gladioli* captan was the most effective fungicide, followed by spergon and thioneb.

3945. OELKER, G.
Moltiplicazione per seme di alcune specie di *Lilium*. (**Propagation of some *Lilium* species from seed.**) [English and German summaries 4 lines each.]
Sementi elette, 1958, **4**: 44-8, illus.

Germination of seed is described for *Lilium philippinense* var. *formosanum*, *L. regale* and *L. davidii*. Seeds of *L. auratum* germinated well after 6 months' storage, during which temperature (up to 20° C.) had little effect on viability. For germination, however, temperatures below 20° C. are necessary for most species, and some will germinate below 15° C. Germinating power is highest immediately after ripening. Experimental autumn sowing of species that germinate rapidly showed that winter temperatures as low as −16° C. were not adverse, provided there was no previous warm spell to start germination. Seeds of species which form bulbs before producing aerial growth (e.g. *L. martagon*, *L. canadense*, *L. auratum*, *L. superbum* and *L. japonicum*) should be sown in late February or early March for emergence the following spring. If sown later, emergence is delayed until the second spring after sowing.

3946. BAKKER, J.
Lelie. (**Lilies.**)
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 57-60.

Variable responses in the forcing of 4-year-old bulbs resulted from storage for different periods at 17° C., followed by 2° C. until planting. There was little difference in average stem length, but flower numbers per calyx were highest after 4 and 10 days at 17° C. Flowering after forcing was compared in 3-year-old bulbs of 5 sizes, and flower production was much higher from the largest-sized bulbs than from the small bulbs. The lily Orange Triumph flowered towards the end of April, when planted on the 17 January; this was only 2 weeks later than when bulbs were planted in November.

3947. THOMAS, P. R., WIGGELL, P., AND MOYSE, W. J.
Observations on eelworm control in narcissus in the Isles of Scilly.
Plant Path., 1958, **7**: 49-50.

Two plots, seriously affected by *Ditylenchus dipsaci*, were each treated with EDB and with DD at 100 or 200 gal. per acre. No eelworm-infested plants were found in the first year after treatment; in the second year re-infestation had started, being more severe in the EDB-treated plots than after DD treatment.—N.A.A.S., Starcross, Devon, and Isles of Scilly.

3948. KRAGTWIJK, C.
Ornithogalum. Teeltprosven. (**Cultural experiments with *Ornithogalum*.**)
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 60-4.

Flower production and growth of newly-imported chincherinchee bulbs and of older bulbs (flowered for one season after import) were compared. Flowering started in July, and the bulbs were dug at the end of October, and transplanted to continue growth under glass. Results were less satisfactory than in the previous year when the bulbs were transplanted a month earlier. Imported bulbs started to flower earlier than older bulbs; total flower production of imported bulbs was much lower, although quality was slightly higher. When bulbs were grown for 2 months under glass and the glass was then removed, flowering started earlier than in bulbs planted directly outside, but the differences disappeared after about a month. Few bulbs which had flowered for 2 seasons after import survived storage treatment of 6 weeks at 30° C., followed by 4 weeks at 17° C. At these temperatures bulbs which had flowered only once stored satisfactorily, provided the foliage had died down completely before storage was started. Bulbils were stored for 10 weeks at 3 storage temperatures; quality of bulbils from fully matured bulbs was better than from bulbs in which the foliage had not completely died down. Weed control in young bulbs was satisfactory with DNC and fortified oils.

3949. ANDREUCCI, E.
Le coperture di polietilene per la fioritura anticipata dei tulipani. (**Polythene covers for early flowering of tulips.**)
Ital. agric., 1958, **95**: 117-24, bibl. 41, illus.

Polythene sheeting, 0·1 mm. thick, was kept from mid-January to mid-March over frames of wood and string erected over the tulip beds. The long edges were held down by soil and the ends by easily removable stones. Minimum temperatures were slightly, and maximum temperatures markedly, higher under the covers than in the open. The first flowers of the variety Telescopium were ready for cutting by 23 March in beds which had been covered, but not until 7 April in the open. In another part of the same district the variety Kansas began flowering on 16 March in covered beds, but not until 30 March in the open. Economic aspects are discussed with regard to Italian conditions.

3950. Toyoda, T., and Nishii, K.
Studies on the high temperature treatment of tulip bulbs to prevent flowering. (II.) Relation between the degree of injury in the flower bud and the yield of new bulbs. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1958, **27**: 63-7, bibl. 1, illus.

Heat treatment was applied to tulip bulbs of 2 varieties, starting on 3 dates and continuing for various periods. A few bulbs were removed at intervals to assess the extent of injury. Injury to the flower buds was classified as occurring in 4 stages. The highest yield of new bulbs was obtained when injury reached the second or third stage. [For Part I, see *H.A.*, 28: 2904.]

Lawns and sports turf.

(*See also* 3564, 3602, 3603, 3996i, t, x, y, 3997d.)

3951. S[mith], J. D.
Seed dressing trial, 1957.
J. Sports Turf Res. Inst., 1957, **9**: 369-72, bibl. 2.

The seedling emergence of Chewings' fescue seed dressed with 1% or 0·5% thiram and sown at the rate of 0·1, 0·2 or 0·4 g. per row in uninoculated soil or soil inoculated with *Fusarium culmorum* in April, July or September was compared with that of untreated seed. With all sowings, seeding and dressing rates, whether the soil was inoculated or not, considerable increases in emergence were noted when the seed was dressed. In some cases the 1% thiram dosage proved better than the 0·5%. Emergence of seedlings from inoculated and uninoculated soils was lower in the September sowings than in those of April and July, particularly at the higher rates of seeding. It is concluded that the higher seedling population resulting from the higher rates of seeding favoured a higher incidence of the disease when conditions were favourable for infection. J.R.L.

3952. Musser, H. B., and Duich, J. M.
Response of creeping bentgrass putting-green turf to urea-form compounds and other nitrogenous fertilizers.
Agron. J., 1958, **50**: 381-4, bibl. 7.

Results of 50 clipping weight determinations made on variously treated plots of creeping bentgrass turf maintained at putting-green height during the 1956 season are presented. Individual treatments at the rate of 8 lb. of N per 1,000 sq. ft consisted of 2 urea-formaldehyde compounds, ammonium sulfate, urea and 2 processed sewage sludges, in 5 replications. The results showed that:—The soluble forms of N (ammonium sulfate and urea) produced the highest total growth during the season, but no apparent relationship between total growth and turf quality was found. The growth curves for the various materials showed a high degree of uniformity, particularly during the latter part of the growing season. The soluble N materials produced significantly higher clipping weights than the processed sludges only during the early part of the season. There was little or no practical difference in the growth response as between the two urea-formaldehyde compounds with single or split applications of these materials. Both clipping-weight and turf-quality determinations indicate that the value of any form of N depends primarily upon how it is used rather than the form in which it is applied. [From authors' summary.] —Pa agric. Exp. Stat., University Park, Pa.

3953. Youngner, V. B.
Gibberellin on Zoysia grass.
Calif. Agric., 1958, **12** (7): 15.

Although the height of Zoysia grass was increased by gibberellic acid applied at 10 and 100 p.p.m., no treatment produced a significant increase in horizontal spread and in the rate of establishment. Sprigs treated with 100 p.p.m. showed signs of injury and showed a slightly lower percentage of survival than did untreated sprigs.

3954. S[mith], J. D.
***Corticium* disease fungicide trial 1957.**
J. Sports Turf Res. Inst., 1957, **9**: 367-8, bibl. 2.

Applications of cadmium chloride/urea, malachite green/bordeaux mixture, Fungicide 12 (Mersil) or actidione completely prevented the appearance of *Corticium* disease. Nystatin and Phemox were not so effective, and the latter also scorched the turf. J.R.L.

3955. Smith, J. D.
The effect of dollar spot disease on the botanical composition of turf of sea-marsh fescue.
J. Sports Turf Res. Inst., 1957, **9**: 322-3.

Dollar spot disease (*Sclerotinia homoeocarpa*) was effectively controlled on a sea-marsh turf with a cadmium chloride/urea fungicide. The following year 65–75% of the turf in the treated plots consisted of sea-marsh fescue (*Festuca rubra* ssp. *rubra*), compared with 45–49% in the untreated plots. J.R.L.

3956. S[mith], J. D.
Dollar spot—fungicide trial, 1956.
J. Sports Turf Res. Inst., 1957, **9**: 353-4.

In a trial, in which griseofulvin was found to be ineffective in preventing the appearance of the small-spot symptoms of dollar spot disease (*Sclerotinia homoeocarpa*) in a turf composed of 2 strains of red fescue, phenyl mercuric acetate and cadmium chloride/urea mixture were found to prevent the disease, the former being the most effective. J.R.L.

3957. Smith, J. D.
Cadmium chloride/urea for dollar spot control. With a note on the effect of cadmium chloride with sulphate of ammonia applications on earthworm casts.
J. Sports Turf Res. Inst., 1957, **9**: 355-9.

Cadmium chloride/urea proved very effective in suppressing symptoms of dollar spot disease (*Sclerotinia homoeocarpa*) in turf of bowling greens that were in use for playing. However, eradication of the disease did not occur, and it is concluded that applications should be repeated at intervals throughout the summer. In a fertilizer/fungicide trial it was noted that the pH of turf was markedly depressed by applications of sulphate of ammonia but not by the cadmium fungicide. The higher the fertilizer dosage the more marked was the pH depression and the lower the number of worm casts. Regardless of the amount of fertilizer applied the use of the cadmium fungicide also resulted in a reduction in the number of worm casts. J.R.L.

3958. SMITH, J. D.
Fungi and turf diseases. 7. Fairy rings.
J. Sports Turf Res. Inst., 1957, **9**: 324-52, bibl. 22, illus.

Marasmius oreades and *Psalliota arvensis* cause the worst types of fairy ring, killing or badly damaging the grass. A list is given of 9 species which stimulate the growth of grass and of 16 species which have no noticeable effect. *Marasmius* rings are usually found on light sandy soils of low nutrient status having a pH of 5·1–7·4. The soil of 3 rings was sampled and more N was found in the outer stimulated ring than elsewhere. The distribution of other fungi and of bacteria within the different zones of *Marasmius* rings was also determined. Since 1951 experiments have been carried out to find a method of control. No fungicide has had any appreciable effect on established rings, but E 49/1 (a halogenized nitrobenzene compound) made the rings slightly less pronounced. A method of controlling rings due to *M. oreades* is given, in which the turf is stripped from an area 1 ft inside the inner green zone to 1 ft outside the outside green zone and discarded. The soil beneath is worked to a fine tilth and a formaldehyde solution is applied to the bare soil. The area is sealed with polythene sheeting, tarred paper or wet sacks and left for 7–10 days. The sacks are removed, the soil aired and the turf resown. The collection of fructifications from fairy rings and applications of a phenyl mercuric acetate fungicide to reduce the spread of spores is recommended. J.R.L.

3959. S[MITH], J. D.
***Fusarium* patch disease fungicide trials, 1957.**
J. Sports Turf Res. Inst., 1957, **9**: 360-3.

In 4 experiments to compare the efficiency of fungicides in preventing the appearance of *Fusarium* patch disease (*F. nivale*) on fine turf cadmium chloride/urea, Verdasan, Merfusan and Fungicide 12 (Mersil) all proved effective. Actidione and its semicarbazone derivative gave appreciable control of the disease but caused marked persistent scorching. Nystatin was ineffective and the oxime derivative of Actidione appeared to favour infection. J.R.L.

3960. SMITH, J. D.
A new fungicide formulation for *Fusarium* patch disease control.
J. Sports Turf Res. Inst., 1957, **9**: 364-6.

Fungicide 12 (now marketed as Mersil) is based on mercurous and mercuric chlorides formulated for application to turf as a spray. It has given satisfactory control of *Fusarium* patch disease, suppressed symptoms of dollar spot disease and prevented the appearance of *Corticium* disease (*C. fuciforme*). J.R.L.

3961. KELSHEIMER, E. G., AND KERR, S. H.
Insects and other pests of lawns and turf.
Circ. Fla. agric. Exp. Stats **S-96,** 1957, pp. 22, illus.

The following major pests, the damage they do and control measures for use against them are described in detail:—chinch bugs (*Blissus insularis*), the tropical sod webworm (*Pachyzancla phaeopteralis*), armyworms (*Laphygma frugiperda*), mole-crickets (*Scapteriscus* spp.), white grubs, leafhoppers and scale insects. Various minor pests are also dealt with briefly.

Orchids.

(*See also* 3996d.)

3962. GRISVARD, P.
La multiplication des *Cypripedium* aux jardins du Luxembourg. ***Cypripedium* propagation in the Luxemburg Gardens,)**
Ann. Soc. nat. Hort. Paris, 1958, **4**: 375-83.

The collection of *Cypripedium* orchids in the Luxemburg Gardens was started in 1880 and now numbers 335 species and varieties. This paper analyses propagation records from 1898 to 1955, inclusive, relating seed production, quality, viability and other characteristics to season and temperature. A list of successful *Cypripedium* hybridizations is also given.

3963. ELA, V. M.
Notes on diseases of orchids in the Philippines.
Philipp. Agric., 1958, **41**: 531-7, bibl. 6, illus.

Bacterial soft rot, *Sclerotium* disease or basal rot, *Phytophthora* or black rot, anthracnose and bacterial brown rot are described. Suggestions are made for control in each case.

Succulents.

3964. VAN DER ZWAARD, P.
Kalanchoe. Toppen na de kortedagbehandeling. **(Topping *Kalanchoë* after short-day treatment.)**
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 56-7, illus.

Growing points (±5–6 cm.) were removed from *Kalanchoë* plants immediately after 3 weeks of short-day treatment in August and treated as cuttings. All plants flowered in November, and there was no difference in quality between topped and non-topped plants and cuttings.

Roses.

(*See also* 3908, 3996j, s, z, 3997k, 4181.)

3965. GARAVINI, C.
La ticchiolatura della rosa. **(Black spot of roses.)**
Inf. fitopat., 1958, **8**: 139-40, illus.

Rosa cinnamonea, *R. pendulina*, *R. multiflora* and *R. wichuriana* are immune to *Diplocarpon rosae*. Fungicides recommended for spring and summer treatment of infected roses are dithiocarbamates or 0·8–1% bordeaux mixture. Sulphur is suitable for greenhouse roses.

3966. KOEK, P. C.
Roos. Bestrijding meeldauw. **(Mildew control on roses.)**
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 75-8.

Sphaerotheca pannosa on glasshouse roses was controlled in 4 experiments with streptomycin sulphate plus glycerine and a wetter; no flower scorching was observed. A sulphur material also gave good control, but spoiled the flowers.

3967. Weinstein, L. H., and Laurencot, H. J., Jr.
Senescence of roses. II. Dark fixation of CO_2 by cut Better Times roses at different stages of senescence.
Contr. Boyce Thompson Inst., 1958, **19**: 327-40, bibl. 26.

Experiments were carried out to study the amount of CO_2 fixed in the dark by cut Better Times roses at different ages [see also *H.A.*, 27: 3785]. Results show that incorporation of C^{14} into petal proteins decreased as the roses aged, while increased incorporation was found in receptacle proteins. Alpha-ketoglutarate became labeled, and the amount of radioactivity decreased with age. No radioactivity was detected in pyruvate, which was present in small quantities. In both petal and receptacle tissues, radioactivity was detected in malate, citrate, succinate, and fumarate. In petals the amount of radioactivity in malate remained relatively constant, while it fell off in citrate. In receptacles, there was an increase in labeled malate and a decrease in labeled citrate during the aging process. Total glucose, fructose, ribose, and xylose were detected in petal tissues. Both glucose and fructose decreased while ribose and xylose increased in concentration during aging. Insignificant radioactivity was detected in the sugar fraction. In petals, significant radioactivity was detected only in aspartate, glutamate, and glutamine with a trace present in alanine, serine, glycine, and asparagine. In receptacles, activity was detected in aspartate, glutamate, glutamine, serine, asparagine and glycine, with traces in alanine, valine, γ-aminobutyrate, and the leucines. In petals, the amount of C^{14} incorporated into aspartate, glutamate, and glutamine decreased with age of tissue. In general, the opposite was true for amino acids and amides in receptacles, with the exception of serine. The molar ratios of amino acids of petal and receptacle proteins at different ages show no significant differences, with the exception of aspartate and proline; nor is much qualitative difference evident between petal and receptacle proteins. The total amount of C^{14} incorporated into petal tissues decreased during aging. There was a net increase in the total amount incorporated into receptacle tissues. On a total bloom basis, there was a small increase with age. The data suggest participation of the Krebs cycle in roses. The dark fixation mechanism appears to be impaired in aging petals and stimulated in aging receptacles. Conversion of malate to citrate is inhibited in aging tissues. [Authors' summary. For Part I, see *H.A.*, 28: 723.]

3968. Weinstein, L. H., Smith, W. R., and Laurencot, H. J., Jr.
Senescence of roses. III. Isolation and identification of l-quinic acid from Better Times roses.
Contr. Boyce Thompson Inst., 1958, **19**: 341-8, bibl. 31, illus.

l-Quinic acid was isolated and identified from petal and receptacle tissues of Better Times roses. Preliminary data indicate that it makes up between 1 and 5% of the dry weight of petal and between 5 and 8% of the dry weight of receptacle tissues, and that it is the dominant nonketo organic acid of these rose tissues. [Authors' summary.]

3969. Mapson, L. W., and Tomalin, A. W.
Preservation of ascorbic acid in rose hips during storage.
J. Sci. Food Agric., 1958, **9**: 424-30, bibl. 3.

The stability of ascorbic acid in rose hips stored under various conditions has been investigated. The growth of fungi on hips can be completely inhibited by certain treatments [in particular, gas storage], but even so, the loss of ascorbic acid occurs at a rate similar to that in fruits in which fungal infection is evident. Treatments which cause physiological damage but prevent fungal attack accelerate the rate of loss of the vitamin. It is concluded that the main loss of ascorbic acid from hips stored above 0° C. is due to physiological damage rather than to fungal infection. At temperatures below 0° C., the growth of moulds is prevented, but loss of ascorbic acid occurs through enzymic oxidation. This loss is fairly rapid at temperatures above −10° C., but the rate of loss at −20° C. is so slow that satisfactory storage for periods of 6–12 months may be achieved. [From authors' abstract.]—Low Temp. Res. Stat., Cambridge.

Other trees and shrubs.

(*See also* 3251, 3252, 3285r, 3996a, e, n, q, v, w, 3997i, l, o, p, 4160.)

3970. Richards, M., and Forno, J. D.
Propagation under mist.
N.Z. Plants and Gdns, 1956, **1** (3): 3-6, illus. [received 1958].

During the summer of 1955-56 a trial was carried out on the rooting of cuttings, using an electronic leaf control to regulate a mist unit in an outdoor cutting bed shielded by a polythene windbreak. Using hard water an absorbent type leaf electrode proved more satisfactory than a perspex electrode. Over 75% rooting was obtained with *Azalea indica*, 3 camellia varieties, a ceanothus hybrid, *Daphne burkwoodii*, *Prunus tomentosa* and species of *Cornus*, *Euonymus*, *Hypericum*, *Photinia* and *Viburnum*. Some root formation also occurred with *Azalea mollis*, *Daphne indica*, *Garrya elliptica* and *Magnolia stellata*.—Massey agric. Coll.
J.R.L.

3971. Breviglieri, N., and Costa, L.
La propagazione per talea con la nebulizzazione. **(Mist propagation of cuttings.)**
Ital. agric., 1957, **94**: 21-39, bibl. 36, illus. [omitted in error from *H.A.*, Vol. 27].

Modern mist-propagation equipment and practices are reviewed. The results of experiments carried out in Italy are described for olives and the following ornamental shrubs and trees:—*Camellia japonica*, *Cryptomeria* spp., *Eleagnus pungens variegata aurea*, *Eugenia jambos*, *Eupatorium ageratoides*, *Fuchsia elegans*, *Lasiandra macrantha*, *Juniperus sinensis pfitzeriana aurea*, *Libocedrus chinensis*, *Magnolia glauca*, *M. fuscata*, *M. obovata*, *Olea fragrans*, *Osmanthus ilicifolia*, peach varieties Dixired and Redhaven, *Podo-*

carpus koreana and *Viburnum lucidum.* Olive cuttings varying in size and age were taken from the variety Leccino. The best rooting medium for these was medium-grained vermiculite. Results were good with coarse or fine vermiculite and with sphagnum moss or building sand, but fine sea sand was much less satisfactory. Without mist there was practically no rooting or callus formation. [For further work on the mist propagation of olives see abstract 4038.]

3972. WAXMAN, S.
Light treatment in the propagation of woody plants.
Gdn J. N.Y. bot. Gdn, 1958, **8**: 139-40, illus.

Studies carried out on the use of long photoperiods to prevent dormancy and cause continued growth in flowering dogwood and other woody plants are outlined [see also *H.A.*, 28: 2928]. Cuttings of rhododendron, dogwood, magnolia and weigela set in a mist propagator showed increased rooting when provided with long photoperiods. Cuttings of flowering dogwood subjected to 18-hr photoperiods for about 30 days while rooting in the propagator produced an additional year's growth 3 weeks after the cessation of the long-day treatment.

3973. MAHLSTEDE, J. P.
Report of Field Trials Committee for 1956. —Photoperiod studies.
Proc. 6th annu. Mtg Plant Propagators' Soc., Cleveland, Ohio, 1956, pp. 130-4.

Observations are reported on the responses of many ornamental shrubs to exposure to light of various intensities for 2 hrs during the dark period. On the basis of the results obtained, the plants were grouped into the following categories: (1) Increased growth at all light intensities, compared with no light: *Caragana arborescens, Euonymus nana, Kolkwitzia amabilis, Ligustrum lucidum compactum.* (2) Increased growth at high light intensities, compared with low intensity or no supplementary light: *Forsythia suspensa, Lonicera claveyi nana, Lonicera purpurea, Prunus besseyi.* (3) Stunting at high and low intensities; normal or increased growth at intermediate intensities: *Elaeagnus angustifolia, Fraxinus pennsylvanica, Philadelphus virginalis.* (4) Increased growth at medium or low light intensities, compared with no supplementary light: *Spiraea frobeli, Weigela vaniceka.* (5) Stunting at high intensities; normal or increased growth at intermediate or low intensities: *Berberis thunbergi, Caryopteris* Blue Mist. (6) Stunting at all light intensities: *Abelia grandiflora, Cornus nana, Chaenomeles lagenaria, Cotinus coggygria, Ilex cornuta burfordi, Syringa* President Grevy. (7) No response to light period: *Deutzia lemoinei, Gardenia fortunei* (apart from better branching under light), *Rosa* varieties, *Syringa vulgaris* varieties.

3974. NORTH, C. P., RYAN, G. F., AND WALLACE, A.
Maleic hydrazide tested on ivy [and other plants].
Calif. Agric., 1958, **12** (6): 7, 15, illus.

Maleic hydrazide effectively inhibited growth of various ground cover and hedge plants for 4–6 weeks. Four spray applications of MH (MH-30 at 0·25% or MH-40 at 0·25–0·35%) starting in June checked the growth of ivy and of *Trachelospermum jasminoides* until the following March. The most satisfactory control was obtained by trimming the plant to the desired size, and letting the new tips grow before MH application. Broadleaf evergreen plants tended to become more bushy after MH application, and flower development was not suppressed at non-injurious concentrations. Plants of *Juniperus chinensis* produced only juvenile foliage after treatment with 0·2% MH-30. Young shoots and leaves of camellia showed slight or no initial inhibition after treatment with 0·35–0·375% MH-40, but further bud development was partially inhibited for 9 months. In limited trials 0·25% MH-30 was compatible with DDT, diazinon and malathion.

3975. SCHREAD, J. C.
Thimet soil treatments for the control of leaf miners.
J. econ. Ent., 1958, **51**: 245-6, bibl. 3.

A 2% granulated formulation of the systemic insecticide Thimet [diethyl ethylthiomethyl dithiophosphate], applied to the soil under the periphery of trees or shrubs, controlled the birch leaf miner (*Fenusa pusilla*), the holly leaf miner (*Phytomyza ilicis*) and the boxwood leaf miner (*Monarthropalpus buxi*). In most cases the material was watered in to facilitate quick absorption. Effective dosages ranged from 0·08 oz. actual Thimet per small boxwood plant to 4 oz. for a holly tree 6 to 8 ft high.—Conn. agric. Exp. Stat., New Haven.

3976. ANZALONE, L., Jr., AND PLAKIDAS, A. G.
Control of flower blight of camellias in Louisiana with fungicides.
Plant Dis. Reptr, 1958, **42**: 804-6, bibl. 4.

Soil drenches of wettable sulphur, captan, ferbam and Terraclor (pentachloronitrobenzene) were compared for suppression of apothecial development of *Sclerotinia camelliae.* All the fungicides were applied in water at 300 lb. per acre on 4 and 30 January. All suppressed apothecial development to some extent, but only Terraclor gave complete inhibition.—La St. Univ., Baton Rouge.

3977. GARRIS, H. R.
Spot anthracnose of flowering dogwood.
Folder N.C. agric. Ext. Serv. **150,** 1958, 1 folded sheet, illus.

Damage caused by *Elsinoë corni* may be controlled by captan or maneb at 2 and 1½ lb. per 100 gal. respectively. Four sprays per year are needed, viz. at flower bud opening, at bract fall, 4 weeks later, and in late summer when next year's flower buds are formed.

3978. STAHN, B.
Der *Erica gracilis*-Klonvergleichsanbau 1956. (**Comparative cultural trials with *Erica gracilis* clones.**)
Dtsch. Gartenb., 1957, **4**: 302-4, illus.

In trials with several clones time of flowering was shown to be dependent on manurial treatment and heredity. Flowering was later and poorer where low levels of P were supplied.—Inst. Gartenb., Karl-Marx Univ., Leipzig.

3979. Bik, R. A., Marchal, J., and Koek, P. C.
Erica. [In Dutch.]
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 43-4.

Six potting composts were compared for *Erica gracilis*, and the best results were obtained with a mixture of 2 parts Wilnisser peat soil plus 1 part conifer forest soil, with rotted conifer forest soil and with peat. In a damp growing season, conifer forest soil alone or with black soil gave the best results for holding plants out of doors during the summer; peat induced some acceleration in flowering. *Botrytis cinerea* on cuttings was controlled by B 500 [see also *H.A.*, 28: 2856].

3980. Fleming, R. A.
The rooting response of softwood cuttings of forsythia and ligustrum to treatment with gibberellic acid.
From abstr. in *Agric. Inst. Rev.*, 1958, **13** (3): 37-8.

Softwood cuttings of forsythia var. Spring Glory and *Ligustrum ovalifolium* were taken throughout the season and soaked for 24 hrs in gibberellic acid in solution or in talc at 10, 20 or 40 p.p.m. GA in talc had little effect at any concentration. In solution the lowest concentration slightly inhibited or retarded root growth, compared with no treatment. At the highest concentration rooting was markedly inhibited in both species. Only at the 2 higher concentrations was there any significant increase in apical elongation of the cuttings, and that only in forsythia.—Ont. Dep. Agric., Vineland.

3981. Nichols, L. P.
Hawthorn spraying in Pennsylvania with zineb.
Plant Dis. Reptr, 1958, **42**: 713, bibl. 2.

Parzate or Dithane Z-78 were applied 4 times during the summer at the rate of 2 lb. per 100 gal. to several *Crataegus* species to control leaf blight (*Fabraea maculata*). No injury was observed on any species. Almost complete control of blight was obtained on Paul's Scarlet hawthorn.—Pa St. Univ., University Park.

3982. Woods, J. J.
Holly propagation under Mazda lights.
From abstr. in *Agric. Inst. Rev.*, 1957, **12** (3): 40.

Propagation boxes, approximately 3×3×3 ft, made from ½-in. pressed pulp board, were placed in a corner of a dark basement and lighted and heated exclusively with 60- and 100-watt Mazda lights, which respectively maintained temperatures at approximately 60° and 70° F. Lights were burned continuously throughout the experiment. Cuttings of *Ilex aquifolium* were set in flats filled with sand and then placed in the propagating boxes at different dates extending from October 1956 to March 1957. The percentage of cuttings which rooted in each flat varied from 63 to 100%. Substantial numbers of each lot had rooted after 45 days, but better results were obtained when cuttings were grown for longer periods. All rooted cuttings made satisfactory growth when they were transplanted to flats filled with potting soil and grown under normal greenhouse conditions.—Canada Dep. Agric., Saanichton.

3983. Box, C. O.
Nursery stock grown in containers.
Miss. Fm Res., 1957, **20** (11): 3, illus.

Burfords holly (*Ilex cornuta burfordi*), raised in gallon containers under different patterns of N+K application, grew best with frequent fertilization, i.e. at fortnightly and weekly intervals. Cherry laurel (*Prunus caroliniana*), grown in various media, grew best in the first year when the medium contained some soil but, later, provided the medium was moisture-retaining and adequate fertilizer and water were given, no differences in growth were observed.

3984. Swenson, K. G.
Holly bud moth control.
J. econ. Ent., 1958, **51**: 87-90, bibl. 13.

Excellent control of the holly bud moth, *Rhopobota naevanna*, was obtained in Oregon with a single spray of malathion applied some time between the opening of the leaf buds and flowering. Good control was also achieved with methoxychlor. DDT did not give consistent results.—Ore St. Coll., Corvallis.

3985. Marchal, J., and Bik, R. A.
Hortensia. (**Hydrangea.**)
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 54-6.

Flowering of 2 early-forcing varieties was accelerated after storage at 2° C. for 7 or 9 weeks from 21 September. Flower quality was better after 9 weeks' treatment than after 7 weeks. There were indications that flower colour could be altered by soil and foliage applications of aluminium sulphate during the forcing period; small applications of aluminium sulphate every other day were more effective than a few large applications of alum.

3986. Bajpai, P. N., and Parmar, A. S.
Effects of some plant regulators on the rooting of cuttings of *Jasminum sambac*.
Sci. and Cult., 1958, **23**: 489-90, bibl. 1, illus.

Dipping in 0·04% IAA gave the best results with hard wood cuttings and in 0·02% NAA with semi-hard wood cuttings. The percentage strike in coarse sand was 86 in both cases compared with 21 and 14% for controls.—Govt. agric. Coll., Kanpur.

3987. Sjulin, J. J., and others.
Propagation of hybrid lilacs by cuttings and other methods.
Proc. 6th annu. Mtg Plant Propagators' Soc., Cleveland, Ohio, 1956, pp. 73-94, bibl. 1.

This symposium consists of 6 papers presented by nurserymen describing the various methods of lilac propagation that they have tested with good results. These include rooting cuttings in a cold frame or shaded house in May, rooting under mist, bench grafting onto green ash roots, and nurse grafting onto *Ligustrum ovalifolium* to obtain lilacs on their own roots.

3988. Clausen, R.
Une expérience de lutte contre le tétranyque tisserand du tilleul. (**A trial on the control of spider mites on lime trees.**)
Rev. hort. suisse, 1958, **31**: 177-80, bibl. 1, illus.

Kelthane emulsion at 0·25% was sprayed on lime trees (*Tilia* spp.) in a Zürich avenue at the beginning of May to control *Eotetranychus tiliarum*. At the beginning of September untreated trees were almost bare, whereas the foliage of treated trees was still healthy.—Maison Dr R. Maag S. A., Dielsdorf-Zürich.

3989. Taylor, P. V.
Melaleuca trees annoy Florida beekeepers.
Amer. Bee J., 1956, **96**: 449, illus., from abstr. in *Bee World*, 1958, **39**: 185.

Beekeeping organizations in this subtropical State are protesting against the increased use of the cajeput or punk tree (*Melaleuca*) [introduced from Australia] in landscape plantings, especially in damp soils. It has a pleasing appearance, blooms profusely and frequently throughout the year, and produces a considerable amount of nectar, but the honey from it is considered extremely disagreeable in odour and flavour. It is stated that as little as 5% melaleuca honey makes a blend with other honeys objectionable.

3990. Marchal, J.
Prunus triloba. De invloed van de buitentemperatuur op het forceren. (**The effect of outside temperature on forcing *Prunus triloba*.**)
Jversl. Proefst. Bloem. Aalsmeer, 1957, pp. 66-7.

Studies have shown that a period of 20 days with temperatures below 5° C. is needed to give the best results in forcing *Prunus triloba*. [For earlier work see *H.A.*, 26: 3039.]

3991. Coggeshall, R.
Rooting Ghent azaleas under plastic.
Amer. Nurserym., 1958, **107** (11): 7-8, 29, illus.

Ghent azalea cuttings were successfully rooted by covering the propagating bench with sheets of 2 ml. polythene plastic over wire frames. The use of plastic prevented the cuttings from drying out and allowed softer wood to be used earlier in the year than was normal. Cuttings 2–3 in. long were taken in late May or early June. The best rooting medium was a mixture of peat, sand and Styrofoam in equal parts by volume. Wounding was not necessary with soft material, but with older cuttings taken in July or August it was beneficial. The use of supplementary incandescent lighting from 5 p.m. to 8 a.m. for 2 months after potting was necessary for successful overwintering.—Arnold Arboretum, Jamaica Plain, Mass.

3992. Nearing, G. G.
Some notes on cutting-propagation.
Gdn J. N.Y. bot. Gdn, 1958, **8**: 84-6, 96, illus.

The author propagates rhododendrons and certain other evergreens in almost air-tight, glass-covered, cold frames with no provision for drainage. The frames, 1 ft deep, are sunk in the ground, and over them is erected a hood, which excludes all direct sunlight. The rooting medium is prepared in 3 layers. At the bottom is a layer of 3 parts peat moss to 1 part screened, spent mushroom manure with a small amount of dusting sulphur. Above this is placed a mixture of equal parts of sand and sedge peat or peat moss, and over this is placed a layer of coarse sand in which the cuttings are set. Cuttings can be struck at almost any season, but October and November give the best results. The potting up of rooted cuttings is generally done the following September. The only attention needed is flood-watering about once a fortnight in autumn, occasionally during the winter when thaws occur, about 3 times a week in the spring and once a week during the summer. Success varies with the variety of rhododendron, but with many varieties 75% or more of rooted plants are commonly obtained.

3993. Kiplinger, D. C.
Studies on the effect of photoperiod and night temperature on flower bud initiation in the azalea Coral Bell (*Rhododendron obtusum japonicum*).
Diss. Abstr., 1957, **17**: 2780-1, being *Publ.* 24,066 of 40 pp.

The effects were studied in 2 seasons of night temperature and photoperiod during July and August on azalea flower initiation. Photoperiods longer or shorter than natural daylength did not affect flower initiation. A cool night temperature of 46–51° F. inhibited flower bud initiation. Under natural conditions of photoperiod and night temperature (61–77° F.) flower initiation occurred at the end of July. Anatomically, the changeover from a vegetative to a reproductive growing point is associated with a change in pith cells from an oblong to an isodiametric shape.—Ohio St. Univ.

3994. Stathis, P. D., and Plakidas, A. G.
Anthracnose of azaleas.
Phytopathology, 1958, **48**: 256-60, bibl. 5, illus.

The symptoms are described of an apparently new leaf-spotting and defoliating disease, which has occurred in severe epidemics since 1954 in nurseries in Louisiana growing both Indica and Kurume types of azalea. Studies on the disease, which has been named "azalea anthracnose", have shown the cause to be a species of *Colletotrichum* typical of the conidial stage of *Glomerella cingulata*. A spraying trial and observations in nurseries have shown that the disease can be effectively controlled by several copper fungicides and by captan, zineb and ferbam.—La St. Univ., Baton Rouge.

3995. Downs, R. J., and Piringer, A. A., Jr.
Responses of several *Viburnum* species to daylengths.
Proc. 6th annu. Mtg Plant Propagators' Soc., Cleveland, Ohio, 1956, pp. 134-6.

Five species of *Viburnum* were subjected to photoperiods of 8, 12, 14 or 16 hrs from May to August. With an 8-hr daylength the main axis and lateral branches of all species made relatively little growth. With longer photoperiods growth of the main axis and laterals was greater, but the number of laterals was not increased except on *V. juddii*. By the end of the test period the total growth increase was from 2 to 5 times as great, depending on the species, with a 16-hr day as with an 8-hr day. Photoperiod did not appear to control flower bud initiation. When transplanted to the field after the end of treatment, *V. carlesii* and *V. juddii* formed no more flower buds, but the number of flower buds on *V. burkwoodii* and *V. chenaultii* nearly doubled after transplanting.—U.S. Dep. Agric., Beltsville.

Noted.

3996.

a Aloi, L.
Alberi nani del Giappone. (**Dwarf trees of Japan.**)
Ital. agric., 1958, **95**: 429-33, illus.
Methods of dwarfing and maintenance.

b Anon.
Plastic pots show well in tests on plant growth.
Comm. Gr, 1958, No. 3266, pp. 264-5.
Compared with clay pots for petunias.

c Bayer, E.
Über den blauen Farbstoff der Kornblume. I. Natürliche und synthetische Anthocyan-Metallkomplexe. (**The blue pigment of cornflower. I. Natural and synthetic anthocyanin-metal complex.**)
Chem. Ber., 1958, **91**: 1115-22, bibl. 15.
Pigment isolated and identified as an Al-Fe cyanin complex.

d Bergann, F., and Mehlhorn, L.
Ein osmundafreies Pflanzsubstrat für epiphytische Orchideen. (**A medium without osmunda for epiphytic orchids.**)
Dtsch. Gartenb., 1958, **5**: 161-2, illus.
Perlon thread waste a satisfactory medium for cattleyas, etc.

e Brierley, P., and Lorentz, P.
A dieback of Belmont gardenias.
Plant Dis. Reptr, 1958, **42**: 986-7.
The dieback is attributed to overwatering.

f Carra, P.
Les chrysanthèmes. (**Chrysanthemums.**)
Rev. hort. Algér., 1958, **62**: 330-42.
Varieties, culture, pests and diseases in Algeria.

g Clauss, B.
Sichtung des Gloxiniensortiments. (**Evaluation of gloxinia varieties.**)
Dtsch. Gartenb., 1957, **4**: 236.
16 varieties (early, mid-season and late) have been selected.

h Clevenger, S.
The flavonols of *Impatiens balsamina* L. and their relation to anthocyanin pigmentation.
Diss. Abstr., 1958, **18**: 34, being *Publ.* 22,680 of 73 pp.
The flavonols of *Impatiens balsamina* L.
Arch. Biochem. Biophys., 1958, **76**: 131-8, bibl. 11.
In the petals and sepals of variously-coloured genotypes.

i Dawson, R. B., and Escritt, J. R.
Playing field construction and maintenance.
J. Sports Turf Res. Inst., 1957, **9**: 302-9.
General advice.

j (Dimond, A. E., and Stoddard, E. M.)
Mercury vapor seen injurious to roses.
Flor. Exch., 1958, **130** (19): 11.
See *H.A.*, 26: 3020.

k Doorenbos, J.
Quelques problèmes concernant l'amélioration du *Cyclamen persicum.* (**Problems in improving *Cyclamen persicum.***)
Rev. hort. suisse, 1958, **31**: 170-5, illus.
Chemical and genetical basis of colour discussed.

l Ehrlich, H. G.
Cytological studies in *Saintpaulia* Wendl. (Gesneriaceae).
Amer. J. Bot., 1958, **45**: 177-82, bibl. 17, illus.

m Everett, P.
Palms and their culture in New Zealand.
N.Z. Plants and Gdns, 1957/58, **2**: 115-19, 151-3, 197-201, 234-9, bibl. 2, illus.
As ornamentals grown in or out of doors.

n Farres, M.
Fernando Riviere y su jardín de aclimatación de Pinya de Rosa. (**Fernando Riviere and his botanical garden Pinya de Rosa.**)
Rev. Inst. agríc. catal., 1958, **107**: 110-14, illus.
At Blanes on the N.E. coast of Spain.

o Forsberg, J. L.
Recommendations for control of common begonia diseases.
Ill. St. Flor. Ass. Bull., reprinted in *Flor. Exch.*, 1958, **130** (19): 12.
Bacterial leaf spot (*Xanthomonas begoniae*), *Botrytis*, and *Pythium* crown and stem rot.

p Gerlach, W., Sauthoff, W., and Pag, H.
Untersuchungen über die *Fusarium*-Welke an *Aechmea fasciata* (Lindl.) Bak. (**Studies on *Fusarium* wilt of *Aechmea fasciata*.**) [English summary ⅓ p.]
Phytopath. Z., 1958, **32**: 416-32, bibl. 21, illus.
F. bulbigenum f. *aechmeae*, symptoms and possible control measures [see also *H.A.*, 28: 1786k].

q Harris, J. H.
Arrangement trees and shrubs.
Ext. Circ. N.C. agric. Ext. Serv. **392,** 1957, pp. 14, illus.
In gardens in North Carolina, including list of suitable species.

r Joe, B.
***Pteris* species cultivated in California.**
Lasca Leaves, 1958, **8**: 26-9, bibl. 4, illus.
A key to 7 spp. and numerous cultivars.

s Kemmerer, H. R.
Pruning trees, shrubs, roses.
Circ. Ill. agric. Ext. Serv., **779,** 1957, pp. 15, illus.
Advice on pruning ornamentals.

t Kemmerer, H. R., and Weinard, F. F.
Zoysia grass for Illinois lawns.
Circ. Ill. agric. Ext. Serv. **778,** 1957, 1 folded sheet.
Management, advantages and disadvantages of Meyer zoysia, and note on Emerald zoysia.

u LAWRENCE, W. J. C.
Studies on *Streptocarpus*. V. Speciation and gene systems.
Heredity, 1958, **12**: 333-56, bibl. 17, illus.
Studies on 27 species; earlier parts noted in *H.A.*, 28: 1785s and t.

v LJAŠENKO, N. I.
Branching in dormant buds of shrubs. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **120**: 199-200, bibl. 7, illus.
Anatomical studies on lilac and other woody ornamentals.

w LONG, F. R.
Cape heaths.
N.Z. Plants and Gdns, 1958, **2**: 250-4, illus.
Including short descriptions of desirable *Erica* spp.

x LUNT, O. R.
Soil types for putting greens.
Parks and Sports Grounds, 1958, **23**: 496, 499-500, 510, bibl. 5.
Mixtures with a high proportion of sand are advocated.

y MCCASKILL, L. W.
The indigenous grasslands of New Zealand and their plants of horticultural importance.
N.Z. Plants and Gdns, 1956, **1** (2): 6-11 [received 1958].
Including a list of over 100 spp.

z MAHLSTEDE, J. P.
Marketing of bare-root rose plants.
Amer. Nurserym., 1958, **107** (10): 9, 76-80, illus.
Ten methods of packing for sale display were compared in 3 types of market.

3997.

a MOHR, O.
Kromosømundersøgelse hos Freesia. **(Chromosome studies on freesias.)**
Horticultura, 1958, **12**: 89-90, bibl. 2, illus.
Diploid, triploid and tetraploid varieties were found.

b MOREAU, M.
Les maladies de dépérissement de l'oeillet. **(Carnation wilts.)**
Ann. Soc. nat. Hort. Paris, 1958, **4**: 370-4, bibl. 4, illus.
Verticillium cinerescens, *Fusarium* spp. and *Alternaria dianthi*; symptoms, prevention and resistance.

c OTTO, A.
Ganzjahreskultur der Freesie? **(Freesia growing all the year round?)**
Gartenwelt, 1958, **58**: 188-90, bibl. 1, illus.
Growing from seed or corms, and varieties.

d P[ALK], R. H.
Production of Chewings' fescue seed and browntop seed in New Zealand.
J. Sports Turf Res. Inst., 1957, **9**: 318-21.
F. rubra var. *fallax* and *Agrostis tenuis*.

e PAPE, H.
Krankheiten und Schädlinge der Edelnelken. **(Pests and diseases of carnations.)**
Flugbl. biol. Bundesanst. Braunschweig **81**, 1958, pp. 10, illus.
Symptoms and control.

f POPHAM, R. A.
Cytogenesis and zonation in the shoot apex of *Chrysanthemum morifolium*.
Amer. J. Bot., 1958, **45**: 198-206, bibl. 33.

g RICHARDS, M.
The temperature requirements of bulbs.
N.Z. Plants and Gdns, 1956, **1** (2): 14-15; (3): 21-3; (4): 15-16, illus. [received 1958].
Including bulbs for forcing and for shipment to the western hemisphere.

h ROBINSON, J. A.
Control of carnation diseases in New Zealand.
N.Z. Plants and Gdns, 1957, **2**: 212-18, bibl. 10, illus.
A key to identification, control recommendations and a suggested spray schedule.

i ROLIN, F.
Les haies. **(Hedges.)**
Rev. hort. Algér., 1958, **62** (2): 6-13, illus.
Suitable species for Algeria, lay-out and management.

j ROSI, M.
I giardini di Roma. **(The gardens of Rome.)**
Ital. agric., 1958, **95**: 31-42, illus.

k SCHINDLER, A. F.
Poor growth of roses in commercial greenhouse beds infested with the fungus, *Lepiota morgani*.
Plant Dis. Reptr, 1958, **42**: 713-14, bibl. 3.
An attempt to control *L. morgani* with the mushroom spawn nematode (*Ditylenchus* sp.) failed.

l SCHUDER, D. L.
Insect pests of honey locust.
Amer. Nurserym., 1958, **107** (10): 13, 90-1, bibl. 5, illus.
And their control.

m TAILLEFER, G.-B., VERNIER, G., AND PEGUY, P.
Révision des groupements des meilleures variétés de chrysanthèmes au 12 Décembre, 1957. **(Revised classification of the best chrysanthemum varieties as at 12th December, 1957.)**
Ann. Soc. nat. Hort. Paris, 1958, **4**: 384-9.

n THERMAN, E.
Valon vaikutuksesta kasveihin. **(The effects of light on plants.)** [English summary 2 lines.]
Puutarha, 1958, **61**: 241-5, illus.
A review including photoperiodic responses of ornamentals.

o VAN RENSSELAER, M.
Selection and propagation of functional shade and street trees.
Lasca Leaves, 1958, **8**: 30-3.
Including *Ginkgo biloba*, *Pistacia chinensis* and *Magnolia grandiflora*.

p YEH, P.-Y., LING, W.-F., AND TAKASAKA, R.
Pigments in the flower of "fu-yong" *Hibiscus mutabilis* L.).
Science, 1958, **128**: 312, bibl. 12.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

See 4045g.

Avocadoes.

3998. DE LA ROCHA, G.
Resultados preliminares de los experimentos de patrones en paltos. **(Preliminary results of experiments with avocado rootstocks.)**
Inf. mens. La Molina, 1958, **32** (368): 1-4.

The variety Fuerte, acclimatized to conditions in the coastal region of Peru, gave promising results on a number of Mexican rootstocks, particularly Nos. 26, 49 and 51, and also on the varieties Topa-Topa and Puebla.

3999. WALLIHAN, E. F., EMBLETON, T. W., AND PRINTY, W.
Zinc deficiency in the avocado.
Calif. Agric., 1958, **12** (6): 4-5, illus.

Two Zn chelates (NaZnEDTA and NaZnHEEDTA) were applied in Fuerte avocado orchards as dry soil applications, by soil-injection in solution, or in irrigation water. Both chelates and all methods of application effectively corrected Zn deficiency. Application of 1 lb. of Zn EDTA per tree raised the Zn content of leaves from 15 p.p.m. to 50 p.p.m., and deficiency symptoms had not reappeared 2½ years later.

4000. WALLACE, J. M.
The sun-blotch disease of avocado.
SCHROEDER, C. A., AND FROLICH, E. F.
Sunblotch in avocado introductions from Texas.
J. Rio Grande Valley hort. Inst., 1958, **12**: 69-74, bibl. 5, illus., and 75.

The first paper reviews recent work on sun-blotch, the only known virus disease of the avocado. Transmission can be effected by seed in two ways: by the use of infected budwood and by naturally-occurring root grafts between adjacent trees. Certain avocado trees are symptomless carriers and give rise to seedling progeny, all, or nearly all, of which are also symptomless carriers. Control is a matter of prevention. Trees used as sources of either budwood or rootstocks can be indexed, but the procedure takes approximately one year to complete. The second paper briefly describes observations, which suggest that certain varieties introduced to California from Texas are symptomless carriers of sun-blotch. They may also provide a clue to the possible cause of a rootstock disorder that occurs when some Mexican-type varieties are grown on West Indian rootstocks.—Univ. Calif., Riverside and Los Angeles.

4001. OLSON, E. O., MAXWELL, N., AND COOPER, W. C.
Azteca—a bud-perpetuated rootstock disorder of some Texas-grown avocados.
J. Rio Grande Valley hort. Inst., 1958, **12**: 76-80, bibl. 6, illus.

"Azteca" is the name given to a disorder which occurs when West Indian rootstocks are worked with certain varieties. It is characterized by the appearance of deep grooves on the bark of the West Indian rootstock when the trees are only 2–6 years old. The growth of affected trees is often stunted. The possible causes of the disease are discussed. The most probable cause of azteca is a virus, and it is possible, though by no means yet certain, that it may be caused by the virus responsible for sun-blotch.—U.S. Dep. Agric. and Tex. agric. Exp. Stat., Weslaco.

Citrus—varieties, rootstocks and propagation.

(*See also* 3284, 4045n-p.)

4002. COOPER, W. C., AND OTHERS.
Nursery and orchard performance of nucellar seedling clones of citrus in the Rio Grande Valley of Texas.
J. Rio Grande Valley hort. Inst., 1958, **12**: 44-52, bibl. 19.

Nucellar seedlings of Valencia orange, Thornton tangelo and several strains of red grapefruit exhibited remarkable vegetative invigoration and were taller, more thorny and less inclined to early fruiting than old-line clones of the same varieties. The fruit produced on these nucellar trees 6 years after planting was similar in shape, size and quality to fruit on old-line trees of the same varieties. The rootstock variety had a marked influence on the size of tree trunks of both old-line and nucellar clonal-line trees. The trunks of nucellar trees on Rangpur lime, Columbian sweet lime, and sour orange rootstocks were 205, 265, and 120%, respectively, of the size of old-line trees on sour orange rootstock. The rootstock also influenced the height of nucellar trees, but the influence was less than that shown for trunk size. While the nucellar-line trees used in this study are apparently free of viruses, and exhibit marked vegetative vigour, they are too young to indicate whether they will also produce superior yields of good fruit. [From authors' summary.]—U.S. Dep. Agric., Weslaco, Texas, etc.

4003. CAMERON, J. W., SOOST, R. K., AND FROST, H. B.
Behavior of nucellar seedling lines.
Calif. Citrogr., 1958, **43**: 290-3.

Characteristics of nucellar seedlings in relation to parent lines are discussed with reference to virus diseases, juvenility, long-term yield behaviour and fruit characters. Some recent data on yields and seediness are tabulated.

4004. Moscoso, C. G.
The Puerto Rican chironja—new all-purpose citrus fruit.
Econ. Bot., 1958, **12**: 87-94, illus.

Discovered in the Puerto Rico mountains this plant is apparently a natural cross between orange and grapefruit which comes true to type from seed presumably by the development of a nucellar embryo. It has all the virtues of both oranges and grapefruit, being, in most characteristics, midway between the two. It probably has an important commercial future. Selection and propagation studies are in progress.

4005. Marloth, R. H.
Rootstocks for grapefruit, [Afrikaans and French summaries ¾ p. each.]
S. Afr. J. agric. Sci., 1958, **1**: 43-65, bibl. 12, illus.

Results are reported from 3 trials started in 1932 with Marsh, Cecily and Triumph scions on 20 types of rootstock. Xyloporosis and exocortis present in the scion material had a marked effect on rootstock performance, while tree decline on all stocks caused by "stem-pitting" disease put an end to the trials after 15 to 18 years. Trees on rough lemon in the early years of bearing and on the lighter soils outyielded those on sweet orange, but not those on Sampson tangelo or Empress mandarin. Fruit quality was poorest from trees on rough lemon, but this stock is still recommended for use in commercial orchards. Sweet orange stocks are recommended when virus-free budwood is obtainable. The use of Sampson tangelo and Empress mandarin is recommended for trial commercial plantings.—Citrus subtrop. hort. Res. Stat., Nelspruit.

4006. Olson, E. O.
Bud-union crease, a citrus disorder associated with some kumquat-hybrid rootstocks and scions.
J. Rio Grande Valley hort. Soc., 1958, **12**: 27-34, bibl. 25, illus.

When both nucellar and old-line Red Blush grapefruit and Valencia oranges were budded on calamondin (*Fortunella* sp. × *C. reticulata*) all but one of the trees developed symptoms of the bud-union disorder, known as bud-union crease, within 31 months. All the budwood used came from trees that had been tested for viruses and found to be apparently free except for the old-line grapefruit which carried exocortis and xyloporosis. Comparable virus-free nucellar and old-line limequats and Meyer lemons worked on calamondins showed no sign of bud-union crease. In another trial Eustis limequat was budded on various rootstocks. All trees worked on sour orange and Sunshine tangelo died within 31 months, whereas trees on other stocks (calamondin, 2 mandarins, Columbian sweet lime, Rangpur lime and Morton citrange) remained healthy. These results are discussed in the light of unsatisfactory stock-scion combinations reported elsewhere, and attention is drawn to the similarity between the symptoms of bud-union crease and those described for unions of pear on quince [*H.A.*, 26: 1419]. The evidence suggests that bud-union crease is not due to a virus but to incompatibility, possibly arising from biochemical differences between some *Citrus* and *Fortunella* species and hybrids. This hypothesis could be tested by trials involving the use of an interstock such as Cleopatra mandarin, which appears to be compatible with grapefruit, sweet orange and the kumquat hybrids.—U.S. Dep. Agric. and Tex. agric. Exp. Stat., Weslaco.

4007. Čajlahjan, M. H., and Nekrasova, T. V.
The effect of growth substances on overcoming polarity in lemon cuttings. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **119**: 826-9, bibl. 2, illus.

The apical ends of lemon cuttings were treated with 4 growth substances alone or in combination with ascorbic acid, and the cuttings were then set with the treated end in sand. Rooting was induced by α-naphthylacetic acid and heteroauxin+ascorbic acid, but no rooting occurred when triiodobenzoic or gibberellic acids were used. Gibberellic acid induced shoot formation in both normally set and inverted cuttings. At 100 p.p.m. it inhibited rooting in normally set cuttings, but at concentrations of 1·0 to 0·01 p.p.m. the inhibiting effect was reduced and 3 to 5 out of 6 cuttings formed roots.

Citrus—sod culture and nutrition.

(*See also* 3441, 4045j.)

4008. Crocker, A. J.
Sod culture in citrus orchards at Gayndah.
Qd agric. J., 1958, **84**: 282-5, illus.

Since 1950 about 25% of the orchards in the irrigated Gayndah have been planted to permanent sod. Experience shows that sod culture has numerous advantages over other systems of soil management but mowing should be regular and the growth of clovers should be fostered. During the first two years after establishment increased nitrogen and irrigation are needed. Thereafter normal fertilizer and water supplies will be sufficient.

4009. Maxwell, N., and Dacus, A.
Fertilizing red grapefruit in sod culture.
J. Rio Grande Valley hort. Soc., 1958, **12**: 19-21, bibl. 2.

A fertilizer trial was started in 1955 in an 11-year-old Webb Red Blush grapefruit grove maintained in permanent sod with overhead irrigation. Ammonium nitrate was applied at 3 lb. N per tree per annum in 1, 2 or 3 doses and with and without other nutrients. N had no effect on yield in the first year, but resulted in a substantial increase over no-N in the second year. Timing of the N applications did not affect yields, nor was there any clear response to any of the other nutrient elements applied. Fruit quality, in terms of total soluble solids and total acids, appeared to be affected more by season than by fertilizer treatments.—Tex. agric. Exp. Stat., Weslaco, and Rio Fms Inc., Monte Alto.

4010. de la Rocha G., G.
Abonamiento con guano de islas, salitre sódico y Nu-green en vivero de naranjos. **(Manuring with guano, sodium nitrate and Nu-green in orange nurseries.)**
Inf. mens. La Molina, 1958, **32** (366): 10-13.

The most successful treatment was one comprising 50 g. each of guano and nitrate of soda per plant, applied in 2 applications a month apart, followed later by 2 foliar applications of Nu-green [urea] with a fortnight interval between. Good results were also obtained when the nitrate of soda was omitted, but not when it was used alone.

4011. Bingham, F. T., Martin, J. P., and Chastain, J. A.
Effects of phosphorus fertilization of California soils on minor element nutrition of citrus.
Soil Sci., 1958, **86**: 24-31, bibl. 33, illus.

On the basis of studies with 9 soils, it is concluded that excessive quantities of $Ca(H_2PO_4)_2$ will induce reductions of B, Cu, and Zn availabilities for citrus plants. Actual increases in Mn and Mg absorption are likely to occur, whereas Fe availability is not greatly affected. No relation existed between total soil contents of B, Cu, Mn, and Zn and the effects of excess P fertilizer. [Authors' conclusions.]—Univ. Calif. Citrus exp. Stat., Riverside.

4012. Koverga, E. L.
The causes of chlorosis in citrus in the Crimea. [Russian.]
Bjul. Vses. n.-i. In-ta Čaja i subtrop. Kul'tur, 1956, No. 1, pp. 154-9, from *Ref. Ž.* (*Biol.*), 1957, No. 16, Abstr. 68,950.

A comparison between the chlorosis induced by Ca and Cl in pot-grown lemons and those occurring in commercial plantations indicated that chlorosis of citrus in the Crimea is due to excess Cl, i.e. more than 0·11% in the soil. In the pot experiments 0·05% Cl in the soil caused leaf drop and withering of shoots.

4013. Stewart, I., and Leonard, C. D.
Use of isotopes for determining the availability of chelated metals to growing plants.
Proc. int. Conf. peaceful Uses atom. En. 1955, 1956, **12**: 159-64, bibl. 9, illus. [received 1958].

Absorption of Fe^{55} and Fe^{59} from ferrous sulphate and FeEDTA by citrus plants showed that the chelate was by far the more available form. Radioautographs of leaves of orange seedlings showed the distribution of FeEDTA to be uniform and that of ferrous sulphate to be concentrated in irregular patches. Uptake of Zn^{65} from zinc sulphate by grapefruit seedlings was low from the 4 soils used, while the uptake from ZnEDTA was 46 times as high on a fine sandy soil but only about 1·3 times as high on heavy calcareous clay. Other grapefruit seedlings increased their absorption of zinc sulphate as the soil pH was reduced from 7 to 6, 5 and 4, but the absorption of Zn in the chelated form followed the opposite trend. EDTA was a more effective chelating agent than EDTA-OH, DEDD, DTP, PDG or acetylacetonate for Zn in citrus nutrition, but all these except the last formed Zn compounds which were more assimilable than zinc sulphate.—Fla Citrus Exp. Stat., Lake Alfred.

4014. Bryan, O. C.
How much copper does citrus need?
Citrus Mag., 1958, **20** (12): 14-15, bibl. in text.

Copper requirements for citrus are related to soil phosphate levels, and records indicate that they range from less than 1 p.p.m. of available Cu in normal soils to 3–5 p.p.m. in soils containing excess phosphates.

Citrus—water and frost responses.

(*See also* 4045h.)

4015. Cassin, J.
Influence du climat sur la floraison des citrus en Guinée. **(The influence of climate on the flowering of citrus in Guinea.)**
Fruits d'Outre Mer, 1958, **13**: 286-92.

In Mediterranean countries the optimal climatic conditions seem to be 2 months of rest during a mild winter (mean temperature 10° C.) with an active period having a mean temperature of about 22°. In tropical countries the optimal climatic conditions seem to be 2 months of rest with a monthly rainfall of less than 100–150 mm. (not necessarily no rain but preferably 50–60 mm. per month) and then, during the setting and swelling of the fruit, a monthly rainfall exceeding 100–150 mm. [Author's conclusions.]

4016. Schultz, G. R., Pederson, H., and Deckard, S.
The sizing-up of citrus fruit in relation to available soil moisture.
J. Rio Grande Valley hort. Soc., 1958, **12**: 22-6, illus.

By measuring the circumference of individual grapefruit with a narrow steel tape twice a week and at the same time determining soil moisture at 6-, 12- and 18-inch depths it has been shown that fluctuations in fruit growth rate closely parallel fluctuations in soil moisture. Such measurements can be made quite simply and could be used by growers as a guide to the timing of water applications.

4017. Anon.
Florida frost warning service reports findings on freeze.
Citrus Ind., 1958, **39** (6): 25-7, and **39** (7): 14-17.

Some measure of frost protection has been obtained by banking soil up to 12–18 in. around the trunks of small citrus trees, by the use in nurseries of plastic shelters warmed by charcoal heaters, and by covering chrysanthemums with heavy black cloth and providing ditches of running water between the flower beds. Observations on temperatures damaging citrus and other fruit trees indicate that dormancy is the main factor affecting tree damage during freezes.

4018. Ladarija, J. N.
The study of frost resistance in citrus by means of cut shoots. [Russian.]
Bjul. Vses. n-i. In-ta Čaja i subtrop. Kul'tur, 1956, No. 2, pp. 59-68, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 78,319.

Frost resistance studies on whole lemon trees and on shoots cut from them gave the same results, thus suggesting that frost resistance can be determined in the laboratory. The shoots should be stored for 3 days before freezing them in damp moss or muslin at 4–10° C., and after the freezing treatment injury shows up best when the shoots are held at the same 4–10° range.

Citrus—diseases and pests.

(*See also* 4006, 4045b, e, f, k-m, 4048.)

4019. Olson, E. O., Sleeth, B., and Shull, A. V.
Prevalence of viruses causing xyloporosis (cachexia) and exocortis (Rangpur lime disease) in apparently healthy citrus trees in Texas.
J. Rio Grande Valley hort. Inst., 1958, **12**: 35-43, bibl. 9, illus.

Budwood-source trees in common usage in Texas are known to be free of psorosis and tristeza viruses. Apparently healthy budwood-source trees were indexed for the following viruses by propagating them on one or more indicator rootstocks: Orlando or Sunshine tangelo for cachexia, Columbian sweet lime for xyloporosis, Morton citrange for exocortis, and Rangpur lime for Rangpur lime disease. Every old-line grapefruit tree tested on tangelo or sweet lime rootstock was infected with cachexia and xyloporosis; many were infected with the virus causing Rangpur lime disease and exocortis. Some old-line sweet orange trees were free of these bud-transmitted viruses; others were not. Nucellar grapefruit, sweet orange, and Rangpur lime trees, as well as an old-line Orlando tangelo and one Meyer lemon, showed no evidence of virus infection. The results of this trial are in agreement with the hypotheses that xyloporosis and cachexia are caused by the same virus, and that Rangpur lime disease and exocortis are caused by the same virus. [From authors. summary. For earlier work see *H.A.*, 27: 1828.]—U.S. Dep. Agric., Weslaco, Texas, etc.

4020. Giacometti, D. C., and Costa, A. S.
Nursery behaviour of infected West Indian lime scions on tristeza tolerant rootstocks.
Plant Dis. Reptr, 1958, **42**: 928-31, bibl. 10, illus.

West Indian lime scions infected with three mild and one severe sources of the tristeza virus were compared in nursery rows at Rio de Janeiro, Brazil. Measurements taken 6 months after budding indicated that the scions infected with the mild virus sources made better growth on sour orange or Florida rough lemon rootstocks than scions infected with the severe source of the virus. Symptoms similar to seedling yellows were noted on axillary growth made by the sour orange rootstock of plants that had a scion infected with the severe virus source. [Authors' summary.]—Inst. Ecol. Exp. agric. and Inst. agron., Campinas.

4021. Machmer, J. H.
Effect of soil salinity on nematodes in citrus and papaya plantings.
J. Rio Grande Valley hort. Inst., 1958, **12**: 57-60, bibl. 4.

Samplings were made at 2 depths in plots of 2-year-old trees of Cleopatra mandarin rootstocks and of grapefruit on sour orange rootstocks, which had received various treatments with Na salts with or without the addition of Ca salts. The population of *Tylenchulus semipenetrans* and of other nematodes was much higher on roots from the plots treated with salts than from untreated plots. In a similar experiment with papaws *Meloidogyne incognita acrita* and other nematodes were also more numerous on salt-treated than on untreated plots, but the differences were less pronounced than in the citrus plots. These results indicate that nematodes will tolerate levels of salts which are high enough to damage, though not to kill, their host plants.—U.S. Dep. Agric. and Tex. agric. Exp. Stat., Weslaco.

4022. Baines, R. C., DeWolfe, T. A., and Small, R. H.
Control of the citrus nematode, *Phytophthora* spp. and weeds by Mylone 85W when applied by different methods.
Plant Dis. Reptr, 1958, **42**: 876-80, bibl. 3.

The effectiveness of Mylone 85W for control of the citrus nematode [*Tylenchulus semipenetrans*], *Phytophthora* spp. and a number of weeds, when applied with different amounts of water, was determined in microplots on a sandy loam soil. Mylone 85W applied at the rate of 400 lb. of active ingredient per acre in 6- and 8-acre inches of water, and also when mixed into the surface soil and irrigated with 6-acre inches of water, killed the citrus nematode in the top 4 feet of soil, and *Phytophthora citrophthora* and *P. parasitica* in the surface 3 feet of soil. When 2- or 4-acre inches of water were applied, control was limited to the 1st and 2nd foot of soil. Six weed species were effectively controlled when Mylone 85W was mixed into the surface soil and then irrigated with 2-acre inches of water, and when it was applied in 2-, 4-, 6-, or 8-acre inches of water. [From authors' summary.]—Univ. Calif., Riverside.

4023. Baines, R. C., and others.
Nematode control on bearing trees.
Calif. Citrogr., 1958, **43**: 328-9.

Dibromochloropropane, applied around lemon and tangerine trees, has effectively controlled citrus nematode [*Tylenchulus semipenetrans*] and increased yields of lemons and tangerines. Control was most effective on sandy soils and was moderately good on 2 silt loam soils. Application by chisel 8–9 inches deep was most satisfactory. Lack of response in 2 orange orchards may have been due to lack of vigour.

4024. Sleeth, B.
Soil fumigation increases growth of citrus replants.
J. Rio Grande Valley hort. Inst., 1958, **12**: 53-6, bibl. 6.

Sour orange seedlings were grown in a screenhouse in 3 old citrus soils and 1 non-citrus soil which had received 4 treatments. The best growth followed soil fumigation with D-D at a rate equivalent to 800 lb. per acre, the growth increments over control plants being 15, 44 and 48% for the 3 citrus soils and 13% for the non-citrus. Leaching with 24–30 inches of irrigation water and the application of N, P and minor elements had less effect on growth, and the application of a heavy dressing of sulphur had no effect. In a field trial fumigation with EDB at 350 lb. per acre increased the size of grapefruit and orange trees, both growing on Cleopatra mandarin or sour orange rootstocks, by an average of 20% over the first 5 years.

4025. Dean, H. A.
Cicada injury of grapefruit twigs.
J. Rio Grande Valley hort. Soc., 1958, **12**: 17-18, bibl. 1, illus.

Severe damage done to 1-year-old grapefruit trees at Donna, Texas, by *Diceroprocta delicata* var. *aurantiaca* is described briefly. Removal and burning of twigs containing cicada eggs proved the most practicable method of control.—Tex. agric. Exp. Stat., Weslaco.

4026. Hely, P. C., and Gellatley, J. G.
Fuller's rose weevil (*Pantomorus godmani* Crotch).
Agric. Gaz. N.S.W., 1958, **69**: 160-2, illus.

The life-history and habits of the weevil are described; damage is mainly on citrus, some deciduous fruits and ornamentals. Recommended control measures include spraying with 0·1% DDT or, better on citrus, with 0·05% dieldrin. If spraying is started early, only the lower foliage, trunk and soil beneath need be sprayed.

4027. Novero, E. S.
Biological study of *Lymantria lunata* Cramer (Lymantriidae, Lepidoptera), with a consideration of its control.
Philipp. Agric., 1958, **41**: 505-25, bibl. 2, illus.

The caterpillars of this moth attack the leaves of citrus and a number of other fruits and vegetables. On occasion trees may be completely defoliated. The present paper is concerned primarily with studies on the life history of the moth, but it also gives details of a spraying experiment on citrus, in which good control was provided by DDT at 0·1 and 0·2%. Dieldrin and lead arsenate at the same concentrations were only slightly less effective.

4028. Jeppson, L. R.
Citrus mite control.
Calif. Agric., 1958, **12** (7): 13.

Kelthane applied at about 16 lb. of 18·5% wettable powder or 16 pints of 18·5% emulsifiable concentrate per acre gave effective control of phosphate and Ovotran-resistant strains of citrus red mite (*Panonychus citri*), 6-spotted mite (*Eotetranychus sexmaculatus*), *E. yumensis* and *E. lewisi*. *Brevipalpus lewisi* was controlled by 8 lb. or 8 pints of Kelthane per acre [see also *H.A.*, 28: 1817]. Kelthane is compatible with most current citrus spray materials and has a low order of toxicity to beneficial insects such as bees.

4029. Dippenaar, B. J.
Concentric ring blotch of citrus: its cause and control. [Afrikaans and French summaries ½ p. each.]
S. Afr. J. agric. Sci., 1958, **1**: 83-106, bibl. 10, illus.

Symptoms of concentric ring blotch are described, and the cause shown to be the gray mite (*Calacarus citrifolii*). Lime-sulphur, sulphur dusts and sprays, Kelthane and chlorobenzilate gave excellent control of the mite. [For an account of earlier work see *H.A.*, 27: 784.]—Agric. Res. Inst., Pretoria.

4030. Jeppson, L. R., Jesser, M. J., and Complin, J. O.
Resistance of the citrus red mite to organic phosphates in California.
J. econ. Ent., 1958, **51**: 232-3.

In a lemon grove in which demetron was used against citrus red mite (*Panonychus citri*) and parathion against red scale (*Aonidiella aurantii*), the red mite developed resistance to demeton. Further tests showed that mites that had developed resistance to demeton were also resistant in varying degrees to 14 other organic phosphates. The most striking example of such resistance concerned Trithion [diethyl *p*-chlorophenylthiomethyl dithiophosphate]. With this compound the concentration needed to kill 95% of non-resistant mites had to be increased 30,000-fold to achieve the same result with resistant mites.—Univ. Calif., Riverside.

4031. Riehl, L. A., LaDue, J. P., and Rodriguez, J. L., Jr.
Evaluation of representative California spray oils against citrus red mite and California red scale.
J. econ. Ent., 1958, **51**: 193-5, bibl. 8.

In laboratory trials with 4 light-medium-grade and 4 medium-grade spray oils, the magnitude of the LD-95 [the lethal dose needed to produce 95% mortality] of the oils that were most efficient against the eggs of the citrus red mite (*Panonychus citri*) was only about half that of the LD-95 required against adult females of the red scale (*Aonidiella aurantii*). The killing action of the oils against red mite eggs was associated with the fractions with the highest boiling points. Values for average molecular weight did not provide a reliable guide to the effectiveness of the oils.—Univ. Calif., Riverside.

4032. Salibe, A. A., and Rodriguez, O.
Eficiente contrôle da ferrugem dos citrus em São Paulo. (Nota prévia.) **(Efficient control of citrus rust mite in São Paulo. Preliminary note.)** [English summary 4 lines.]
Rev. Agric. Piracicaba, 1958, **33**: 123-7, bibl. 3.

Satisfactory control of the mite *Phyllocoptruta oleivora* on several types of citrus was achieved by spraying with dithiocarbamate fungicides. The percentage of affected fruits 145 days after treatment was 4·3 where 1% wettable sulphur was used and 21·6 in untreated controls, but was only 2% or less with 0·5% Rhodiazima (a mixture of dimethyldithiocarbamates of zinc and manganese), 0·12% Dithane Z-78 (zineb) or 0·12% maneb, the last-named being the most effective. Kelthane was less effective than sulphur, and remained active only for 3 months, whereas the dithiocarbamates were effective for 5 months.

4033. Cressman, A. W.
Malathion and parathion with oil for control of California red scale.
J. econ. Ent., 1958, **51**: 257-8, bibl. 4.

In two experiments on lemon trees oil plus malathion was not quite so effective against heavy infestations of *Aonidiella aurantii* as oil plus parathion at the dosages used. However, the advantages of oil-malathion in respect to both mammalian and plant toxicity and its satisfactory performance against citrus red mite (*Metatetranychus* [*Panonychus*] *citri*) suggest that in most cases it should be preferred to oil-parathion.—Agric. Res. Serv., U.S.D.A.

4034. Gunther, F. A., and others.
Field persistence comparisons of residues of the insecticide, Diazinon, in lemons and Valencia oranges and effects on juice flavor.
J. agric. Food Chem., 1958, **6**: 521-3, bibl. 15.

Residues of the insecticide, Diazinon, were determined by an ultraviolet spectrophotometric procedure on and in lemons and oranges. The persistence of these residues is illustrated by the half-life values of 12 to 13 days for lemons and 16 to 17 days for Valencia oranges; Diazinon residues are short-lived compared to most other insecticides and acaricides as residues on citrus fruits. Triangular-type tests of juice from Diazinon-treated fruits showed no detectable flavor changes; citrus peel appears to be an efficient barrier against penetration into citrus juices by odors or flavors from outside sources. [Authors' abstract.]—Univ. Calif., Riverside.

Citrus—fruit harvesting and handling.

(*See also* 3285q, 4045i.)

4035. Grierson, W.
Pretesting oranges for susceptibility to peel injury.
Citrus Mag., 1958, **20** (10): 10-11, bibl. 6, illus.

It has been found that forms of peel breakdown, which develop on citrus fruits during storage, become very obvious if the fruit is polished after ethylene degreening. By applying these two processes to sample lots of freshly-harvested fruit it is possible to determine the susceptibility of a crop to peel injury within a week. From the information thus provided the grower can decide when such a crop should be picked and whether it should be sent to a packing house or cannery.

4036. McGlasson, W. B.
Washing and waxing oranges.
J. Dep. Agric. S. Aust., 1958, **61**: 487-8, 492, bibl. 1, illus.

The washing and waxing process is described, and sodium orthophenylphenate is recommended for use in the washing tank at 2 lb. SOPP+1 lb. caustic soda in 100 gal., with the pH maintained above 11·7. SOPP can also be used in conjunction with waxing and this may render the diphenyl wrap redundant, although it is still required by export legislation.

Dates.

4037. Martin, H.
Pests and diseases of date palm in Libya.
FAO Plant Prot. Bull., 1958, **6**: 120-3.

Parlatoria scale (*P. blanchardi*) was controlled by climbing the palm and spraying the foliage with 0·05% parathion or 0·05% diazinon, but parathion is not recommended because of its toxicity. The addition of white oil, 2·5%, did not increase the efficacy of the spray but a wetting agent appeared to be desirable. Several less important pests are discussed together with date diseases and storage pests.

Olives.

(*See also* 3971, 4045c, 4193.)

4038. Breviglieri, N.
L'olivo propagato per talea con il metodo della nebulizzazione. **(Olives propagated by mist treatment.)**
Ital. agric., 1958, **95**: 217-26, bibl. 2, illus.

Devices for the intermittent application of mist are briefly discussed. Cuttings of several olive varieties were set in mist propagators (polythene-covered frames), with or without previous immersion of their bases in IBA. Controls had neither mist nor IBA. The best rooting medium was river sand mixed with decomposed humus, but vermiculite, perlite or quartz sand were also satisfactory. Shade was necessary in the open, and in the propagators each time misting was interrupted, but not with continuous misting. In summer, illumination was reduced by 50% in the open, without unduly reducing photosynthesis. Among the controls there was no rooting of subterminal cuttings up to 1 year old and only 2–3% in those 1½–2 years old. Mist propagation gave 39–66% rooting in the younger and 58–91% in the older group. In combination with IBA the corresponding figures were 45–70% and 72–94%. Rooting of apical cuttings was 12–38% under mist and 25–27% when IBA and mist were combined. [For preliminary work on olives see abstract No. 3971.]—Ist. Colt. arbor. Univ. Studi, Firenze.

4039. Petruccioli, G., and Subbioni, F.
Primo contributo allo studio dei rapporti tra il contenuto di umidità e di zuccheri delle foglie dell'olivo e la resistenza al freddo. **(First contribution to the study of relationships between the water and sugar contents of olive leaves and their resistance to cold.)** [English summary ⅛ p.]
Ann. Sper. agrar., 1958, **12**: 945-81, bibl. 29, illus.

In the 5 olive varieties studied the water content of the leaves decreased as the temperature fell, but no clear correlation was found between temperature and leaf sugar content.

4040. Caruso, A.
La lotta contro il *Cycloconium oleaginum* nella provincia di Cosenza. **(Control of *Cycloconium oleaginum* in the province of Cosenza.)**
Not. Mal. Piante, 1958, No. 43/44, pp. 240-1.

Olive trees suffering from a severe attack of leaf spot, and sprayed in early autumn with zineb at 350 g. per 100 l., developed full foliage the following spring and produced a good crop. Repetition of the treatment the following September gave complete protection from the fungus, whereas control trees were defoliated and produced no fruit. Two annual treatments are recommended, one in spring, before flowering, combined with the application of an insecticide against the olive moth, and one in September, combined with control measures against the olive fly.

4041. Atalla, E. A. R.
Studies on the ecology and control of the olive fruit-fly *Dacus oleae* (Gmel.) in Egypt (Diptera-Trypetidae).
Agric. Res. Rev., 1958, **36**: 120-37, bibl. 4, illus.

In Egypt losses caused by olive fly amount to 30% of the total crop. The fly population is at a minimum in May and reaches a peak in November. About 4 overlapping generations occur in the field. Olive varieties differ in susceptibility to attack, those with the largest fruits being most susceptible. Successful control has been obtained with a spray mixture containing 250 g. lindane w.p. 25% gamma isomer, 100 g. flour and ½ litre molasses in 100 litres water; 6–7 sprays are required.—Minist. Agric., Egypt.

4042. Lamouria, L. H., Hartmann, H. T., and Kaupke, C. R.
Mechanization studied in olive harvesting.
West. Fruit Gr, 1958, **12** (6): 20-2, illus.

Catching frames are described, the most effective being shaped like an inverted umbrella, completely surrounding the tree and delivering fruit automatically into boxes. Table olives were mechanically harvested by tree shaker and catching frame using 16% of the normal hand harvest labour at 30% of hand harvest costs. Figures for oil olives were 10 and 30% respectively. Processing olives by the black-ripe method effectively masked the scarring occasioned by mechanical harvesting in table fruit; scarring is unimportant in oil fruit. Padded tree shakers caused no tree injury but unsuitable tree structure is the main hindrance to extended mechanical harvesting [see also *H.A.*, 27: 3172]. Pneumatic hand and cable shakers were less effective than boom shakers.

Passion fruit.

4043. Nishida, T.
Pollination of passion fruit in Hawaii.
J. econ. Ent., 1958, **51**: 146-9, bibl. 5.

Preliminary observations made prior to this study showed that in certain areas [yellow] passion fruit (*Passiflora edulis* f. *flavicarpa*) plants did not set fruit satisfactorily. The present study indicated that the failure to set fruit was due to blossom drop rather than immature fruit drop. The percentage of blossom drop was found to vary from 21·6 to 64·4%. The passion fruit is self-sterile, and insects are the principal pollinators. Among the 15 insect species found to be associated with the flowers, the carpenter bee (*Xylocopa varipuncta*) and the honey bee (*Apis mellifera*) are the most important pollinators. The efficiency of pollination by natural pollinators acting together varied with locality. Lack of fruit set was found to be due not only to lack of pollination but also to other unidentified factors. [Author's abstract.]—Univ. Hawaii, Honolulu.

4044. Groszmann, H. M., and Purss, G. S.
Beating passion vine wilt.
Qd agric. J., 1958, **84**: 341-6, illus.

The golden passion vine (*P. edulis* f. *flavicarpa*) has proved resistant to the soil organism *Fusarium oxysporum* f. *passiflorae*, which causes wilt disease of the purple passion fruit throughout most parts of Queensland. The purple passion fruit can be readily grafted on the golden by cleft or approach grafting, both of which methods are described and illustrated. Many grafted plants have been established in different parts of Queensland. They have remained free from wilt and appear to crop at least as heavily as the purple passion fruit on its own roots.

Sundry.

See 4045d.

Noted.

4045.

a Babin, M. R.
Determination of citrus flavonoids.
Bull. Soc. Pharm. Bordeaux, 1957, **96**: 61-4, from abstr. in *J. Sci. Food Agric.*, 1958, **9**: i-278.
Chemical methods.

b Bartlett, B. R., and Lloyd, D. C.
Mealybugs attacking citrus in California—a survey of their natural enemies and the release of new parasites and predators.
J. econ. Ent., 1958, **51**: 90-3, bibl. 5.
Distribution of 4 *Pseudococcus* spp. and data on activity of numerous natural enemies.

c Basso, M.
Contributo allo studio delle cultivar toscane d'olivo. Indagini eseguite in provincia di Pisa. Le cultivar coltivate sui Monti Pisani. (**Contribution to the study of Tuscan olive varieties. Investigations carried out in the province of Pisa. Varieties grown in the Monti Pisani area.**) [English summary ½ p.]
Ann. Sper. agrar., 1958, **12** (3), Suppl. pp. xiii-liv, bibl. 76, illus.
Variety descriptions, floral biology, etc.

d Carr, W. R.
Southern Rhodesian indigenous fruits, with particular reference to their ascorbic acid content.
Food Res., 1957, **22**: 590-6, bibl. 10, from abstr. in *J. Sci. Food Agric.*, 1958, **9**: i-275.
Sclerocarya birrea, *Parinari mobola* and *Phyllogeiton discolor* contain relatively large amounts of ascorbic acid.

e Feder, W. A., and others.
Citrus varieties, species and relatives susceptible to attack and damage by the burrowing nematode, *Radopholus similis*.
Plant Dis. Reptr, 1958, **42**: 934-7, bibl. 4.
Nearly 400 varieties, species and relatives susceptible [see also *H.A.*, 28: 3026o].

f Fisher, F. E.
Use of zineb in Florida citrus groves for controlling russet and greasy spot.
J. Rio Grande Valley hort. Soc., 1958, **12**: 3-6, bibl. 2.
A review; see *H.A.*, 27: 3861 and 28: 787.

g FLITTERS, N. E., AND MESSENGER, P. S.
Effect of temperature and humidity on development and distribution of Hawaiian and Mexican fruit flies.
J. Rio Grande Valley hort. Soc., 1958, **12**: 7-13, bibl. 1, illus.
Studies in bioclimatic cabinets on *Dacus dorsalis*, *D. cucurbitae*, *Ceratitis capitata* and *Anastrepha ludens*.

h GEORG, J. G.
Use of wind machines for frost protection in a Florida citrus nursery.
Citrus Ind., 1958, **39** (6): 21-4.
Weather conditions under which wind machines are most effective.

i KESTERSON, J. W., AND HENDRICKSON, R.
Utilization of citrus by-products.
Econ. Bot., 1958, **12**: 164-85, bibl. 51, illus.
A review.

j LEVITT, E. C.
Fertilisers.
Citrus News, 1958, **34**: 63, 68.
Recommendations for N.S.W. citrus orchards.

k LIN, K.-H., AND CHU, M.-L.
The relation of *Fusarium* species to yellow shoot of citrus. [Chinese, with English summary 1½ pp.]
Acta phytopath. sin., 1957, **3**: 169-76, bibl. 8, illus.
Fusarium spp. attacking roots of trees affected by "yellow shoot" virus.

l N.S.W. DEPARTMENT OF AGRICULTURE, BIOLOGICAL BRANCH.
Black spot of citrus.
Agric. Gaz. N.S.W., 1958, **69**: 156-7, illus.
Recommendations for controlling *Guignardia citricarpa*.

m OREN, R.
Control of the Mediterranean fruit fly in Israel.
Span, 1958, No. 1, pp. 17-20, bibl. 11, illus.
A review, with special reference to citrus.

n PURCELL, A. E.
Partition separation of carotenoids by silica-methanol columns.
Analyt. Chem., 1958, **30**: 1049-51, bibl. 10.
With examples of its application to red grapefruit, etc.

o SACCO, T.
I frutti del *Citrus hystrix* DC. subsp. *acida* (Roxb.) Bonavia var. *abyssinica* (Riccobono) Chiov. della Somalia. **(Fruit of *Citrus hystrix* subsp. *acida* var. *abyssinica* in Somaliland.)**
Riv. Agric. subtrop. trop., 1958, **52**: 247-59, bibl. 6, illus.
Statistics of fruit size, weight and juice content of the "Somaliland lemon".

p STURIALE, F.
L'arancio in Calabria. Nuovi orientamenti sul problema varietale. **(Oranges in Calabria. New aspects of the varietal problem.)**
Ital. agric., 1958, **95**: 331-43, bibl. 2, illus.
Production, cultural practices in new and old orchards, and varieties.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 4157s, 4168, 4170, 4176, 4180, 4182, 4187, 4192.)

4046. CATALA, R. L. A.
Report on the Gilbert Islands: some aspects of human ecology.
Atoll Res. Bull. **59**, 1957, pp. 187, bibl. 37, illus.

This report, issued by the Pacific Science Board, Washington, D.C., provides a full description of the agricultural and other resources of the Gilbert islanders. Chapters are devoted to the coconut palm, the breadfruit tree and *Pandanus*; and recommendations are made for the improvement of these crops and other agricultural activities.

4047. BOTTON, H., AND HALLE, N.
Les plantes de couverture. Guide pratique de reconnaissance et d'utilisation des légumineuses en Côte d'Ivoire. **(Cover crops. A practical guide to the recognition and use of leguminous plants in the Ivory Coast.)**
J. Agric. trop. Bot. appl., 1957, **4**: 553-615, illus., 1958, **5**: 45-172, bibl. 47, illus.

The first part of the paper concerns the use of cover crops in tropical agriculture. This is followed by a key to the genera and a description of the individual species including notes on their agricultural value. It is well illustrated by photographs and drawings of the commoner types of cover crop.

4048. VAN DINTHER, J. B. M.
Draagmieren in Suriname en hun bestrijding. **(Leaf cutting ants in Surinam and their control.)** [English summary ⅔ p.]
Surinaam. Landb., 1958, **6**: 18-27, bibl. 18.

Atta species, notably *A. cephalotes*, do serious damage to various crops in Surinam, including citrus, coffee and mangoes, and sometimes attack cacao, coconuts and oil palms. Good control of these ants has been obtained with Aldrex (23% aldrin in oil) at the rate of 1 litre per 100 sq. m. surface area of nest. Experiments with aldrin 2% dust at 1 kg. per 100 sq. m. of surface area of nest also gave excellent results and is the method recommended for Surinam conditions.

Bananas.

(*See also* 3529, 3599, 4156p.)

4049. YELF, J. D., RHODES, P. L., AND BHARAT, S.
Banana investigations.
Agric. J. Dep. Agric. Fiji, 1957, **28**: 33-6.

In two trials clean cultivation produced higher yields than did a mown grass-legume sward and a Para grass cover. Fertilizer applications further increased yields. Other investigations in progress are outlined.

4050. Daghistani, I. Y.
Water requirements of bananas in the Jordan Valley.
[*Publ.*] *Jordan Dep. Irrig. Water Power*, 1958, pp. 10 (cyclostyled), illus.

Detailed records of temperature and of water applied and consumed were kept for a Cavendish banana plant grown in a tank established in a banana plantation. The normal local practice of allowing 3 fruiting suckers to develop in the second year was followed. The total monthly consumptive use of water (evapotranspiration) varied with temperature, and, when the mat was fully developed, it ranged from 100–150 mm. in January–March to about 475 mm. in September. Of the water lost evaporation accounted for only 29% or less.

4051. Dumas, J.
Détermination d'une feuille-origine pour l'étude des bananiers cultivés. (**The determination of the first leaf signifying adult status in the study of cultivated bananas.**)
Fruits d'Outre Mer, 1958, **13**: 211-24, bibl. 5, illus.

In a mathematical study of the angle between one side of the lamina and the petiole, the close relationship between this measurement and the foliar index is demonstrated for the variety Petite Naine. Data are also given for Poyo and Gros Michel. When, in a young plant, a leaf opens in which this angle is a right angle, the adult status of the plant is reached, and this provides a starting-point on which to base comparative studies.—I.F.A.C.

4052. Tai, E. A.
Timing the Lacatan banana crop.
Occas. Bull. Jamaica Banana Bd Res. Dep. **1**, 1958, pp. 9, illus.

Depending to a large extent on elevation, Lacatan plant crops take from less than 12 to more than 18 months from planting to harvest. Ratoon crops take up to 2 months longer. Suckers tend to be produced in flushes rather than at regular intervals. Observations and records suggest that, if these facts are taken into account, pruning schedules can be adopted which will result in the bulk of the crop maturing between April and October when the best prices are obtained. This bulletin sets out detailed pruning schedules for a 12-month area, a 15-month area planted in 2 seasons, an 18-month area and a 21-month area.

4053. Guyot, H.
La pratique de l'oeilletonnage chimique. (**The method of chemical sucker removal.**)
Fruits d'Outre Mer, 1958, **13**: 252-4, illus.

A paste of 5 to 10% of a heavy ester of 2,4-D in an animal or vegetable oil is applied with a brush to the cut surfaces of unwanted banana suckers. This causes the slow decomposition of the sucker without adverse effect on the stool. The method is quick and efficacious. —I.F.A.C., Stat. Neufchateau, Guadeloupe.

4054. Price, D.
The selection of oils for spraying against leaf spot disease of banana.
Trop. Agriculture Trin., 1958, **35**: 225-8, bibl. 5.

A laboratory method for assessing the probable phytotoxicity to higher plants of a spray oil was devised, which consisted of flooding agar cultures of a *Fusarium* (actually *F. oxysporum* f. *cubense*) with the spray oil and comparing them with controls flooded with liquid paraffin. The colonies are incubated for 2 hours before flooding and for a further 72 hours afterwards. They are then measured. The method is easily standardized and the test cultures are replicated and randomized. It is suggested that where a spray oil restricts fungal growth by 10% or more than the restriction caused by liquid paraffin, the oil will probably be unduly phytotoxic to higher plants.—Cameroons Develop. Corp.

4055. Sequeira, L., and others.
Role of root injury in panama disease infections.
Nature, 1958, **182**: 309-11, bibl. 9, illus.

A heavy spore suspension of *Fusarium oxysporum* f. *cubense* was applied to healthy main root surfaces of Gros Michel bananas, both at the growing tip and in mature regions. No penetration was observed, and the pathogen showed no evidence of ability to attack living cells of the main root. When the mature tissue of the main root was wounded deeply enough to expose the xylem, fungus penetration occurred rapidly. Wounding immature tissue of the main root, however, did not result in fungus penetration. Some penetration of apparently intact lateral rootlets occurred, but injury was an important factor in rootlet invasion. There was a consistent stimulation of spore germination in the vicinity of a wounded root surface (the stimulants being amino acids, particularly glutamine) and an inhibition of spore germination by the intact root surfaces.—United Fruit Co., Coto Stat., Costa Rica.

4056. Newhall, A. G.
The incidence of panama disease of banana in the presence of the root knot and the burrowing nematodes (*Meloidogyne* and *Radopholus*).
Plant Dis. Reptr, 1958, **42**: 853-6, bibl. 1, illus.

In one experiment which ran for 4 months at Changuinola, Panama, using steamed soil heavily infested with *Fusarium oxysporum* f. *cubense*, over 100% more Gros Michel banana plants came down with Panama disease when *Radopholus similis* was added to the soil. The addition of *Meloidogyne* sp. caused no increase in the disease during this period of time. [Author's summary.]

4057. Stover, R. H., and Fielding, M. J.
Nematodes associated with root injury of *Musa* spp. in Honduran banana soils.
Plant Dis. Reptr, 1958, **42**: 938-40, bibl. 14.

Twelve species of plant parasitic nematodes were obtained from banana soils and *Musa* spp. roots in Honduras. Four of these, *Meloidogyne arenaria*, *Hoplolaimus* sp., *Radopholus similis*, and *Pratylenchus musicola*, were encountered consistently and in abundance. Root injury was more prevalent in sandy loam than in loam or clay loam soils. There was no visual evidence of abnormal growth above ground. [Authors' abstract.]—Vining C. Dunlap Labs, Tela Railroad Co., La Lima, Honduras.

4058. Leach, R.
Controlling banana borer.
Fmr Jamaica, 1958, **62**: 204-11, illus.

The predacious beetle *Plaesius javanicus* has been re-introduced in an attempt to control *Cosmopolites sordidus*, but so far without result. In an experiment involving the application of insecticides to pseudostem borer traps dieldrin gave almost complete control for 5 months. By contrast Cosmopolicide 109 and BHC gave little or no control. In further tests very good control has been obtained with soil applications of a dieldrin powder, made either by mixing 4 lb. of dieldrin 5% w.p. with 96 lb. gypsum and applying 4 oz. per mat (i.e. about 2 lb. actual dieldrin per acre) or by mixing the dieldrin with sulphate of ammonia or a fertilizer mixture in proportions which will supply 2 lb. actual dieldrin per acre. A new and more effective borer trap has also been made by placing a ring of pseudostem 6 in. high on top of a recently harvested pseudostem severed at ground level. Catches of borers in these traps have been much higher than in conventional traps consisting of portions of pseudostem cut lengthwise.—Banana Bd Res. Dep., Jamaica.

4059. Lochmann, H.
Lutte contre le charançon du bananier. **(Banana weevil control.)**
Fruits d'Outre Mer, 1958, **13**: 281-5, illus.

In an experiment in Guadeloupe aldrin was applied once and twice annually, by itself as a spray at 2 g. per stool, and at the same rate combined with 400 g. of 9–9–12 fertilizer mixture. Both methods of application were considerably better than the control, but application as a spray was the most effective. In the later stages of the experiment, however, the results of the two methods became more nearly equal, and numbers of weevils in the control plots also declined.

4060. Castellani, E., Beccari, F., and Matta, A.
Prove preliminari sull'impiego del Mycostatin contro il *Gloeosporium musarum*. **(Preliminary tests on the use of Mycostatin for control of *Gloeosporium musarum*.)**
Not. Mal. Piante, 1958, No. 43/44, pp. 242-4, bibl. 3.

Bananas, immersed in 0·04% Mycostatin (nystatin) with an added wetting agent and shipped in polythene bags in a non-refrigerated hold from Somaliland to Italy, were much less severely damaged by *Gloeosporium musarum* than were untreated bananas, but the antibiotic was not active against *Fusarium* sp.

Cacao.

(*See also* 4156l, m, r, 4157g, n, q.)

4061. Martinez, A., and Noël James, C.
Cacao: bibliografía de las publicaciones que se encuentran en la biblioteca del instituto. **(Cacao: a bibliography of publications in the [Inter-American] Institute library.)**
List. bibl. Inst. interamer. Cien. agríc. Turrialba **2**, Supl. 1, 1958, pp. 132, bibl. 1026.

This supplement follows the lines of the original bibliography [*H.A.*, 24: 4285] in its arrangement under broad subjects such as economics of production, cultural practices, diseases and pests, the cacao tree, the bean and its uses, research programmes, conferences and courses, etc. It cannot fail to be useful to the worker on cacao.

4062. Ríos Vega, A.
La relación patron-injerto en la propagación vegetativa del cacao (*Theobroma cacao* L.). **(The stock-scion relationship in the propagation of cacao, *Theobroma cacao*).** [English summary 12 lines.]
Acta agron. Palmira, 1957, **7**: 223-32, bibl. 10.

With bud scions from cacao varieties SCP No. 5 and SCP No. 6, rootstocks of Calabacillo were more satisfactory than those of Amelonado, Cundeamor, Angoleta or Criollo, with regard to percentage take and early growth. [See also *H.A.*, 27: 3906.]

4063. Cunningham, R. K., and Lamb, J.
Cocoa shade and manurial experiment in Ghana.
Nature, 1958, **182**: 119, bibl. 1.

An area containing 10-year-old Amelonado trees planted under *Gliricidia maculata* shade was chosen for a trial on shade removal and fertilizer (N, P, K, Mg) application. Shaded/fertilized, unshaded/fertilized and unshaded/unfertilized treatments all showed significant increases in yield in the first year compared with the shaded/unfertilized control. In the first year the highest yield of dry cacao per acre was obtained from the unshaded/fertilized plots.—W. Afr. Cocoa Res. Inst., Tafo.

4064. Thresh, J. M.
The control of cacao swollen shoot disease in West Africa. A review of the present situation.
Tech. Bull. W. Afr. Cocoa Res. Inst. **4,** 1958, pp. 36, bibl. 75, illus.

Heat therapy and chemotherapy have failed to cure plants infected with cacao swollen shoot virus and there is no immediate prospect of a therapeutic method being introduced, which can be used on a field scale. Control measures against cacao swollen shoot disease are thus restricted to methods of reducing the spread which normally occurs by the movement of mealybugs from infected cacao or wild hosts to healthy trees. Various methods of reducing spread have been investigated and include the use of insecticides, eradication measures and resistant varieties. The use of mild strains of virus to protect plants from the effects of the commoner virulent ones has also been considered. In addition, unsuccessful efforts have been made to control the mealybug populations on cacao in Ghana by the introduction of fungi and exotic insect parasites and predators to supplement the natural level of biological control exerted by indigenous species. Cutting out infected cacao trees and some of the naturally occurring hosts of cacao viruses has been the only control measure which has been practicable on a widespread scale in Ghana and Nigeria. The survey parties responsible for the routine control operations are hampered by the inaccessibility of some of the farms and by difficulties experienced in spotting virus symptoms on infected trees. Nevertheless, they have achieved some success in eradicating outbreaks and in restricting the build-up of infection. The eradication measures have been particularly successful in areas where the incidence of virus was not high and where it was possible to destroy the apparently healthy trees immediately around each outbreak. In the immediate future, eradication measures are likely to be continued as the basic method of controlling swollen shoot disease. However, they may be made more efficient by the use of insecticides to control the mealybugs on the standing trees which occur around treated outbreaks and which may include missed or latent infections. Preliminary results with a systemic insecticide and with formicides have given encouraging results and warrant further investigation. In the future it may be possible to decrease the rate at which new plantings become infected by the use of resistant and barrier crops, or insecticides may be used to restrict the build-up of mealybug populations on the young trees. Alternatively, new planting material may be protected from the effects of virulent virus by the use of mild strains. [From author's summary.]

4065. Díaz Moreno, J.
Observaciones sobre la incidencia de *Monilia* del cacao en Ecuador. (**Observations on the incidence of *Monilia* pod rot of cacao in Ecuador.**)
Turrialba, 1957, **7**: 95-9, bibl. 14, illus.

The popular idea that cacao pod colour and susceptibility to *Monilia roreri* are related was disproved. The incidence was low in years of low rainfall, and was reduced, but not significantly, by shading.

4066. Jakobs, H.
Pertjobaan pemeraman pada kakao-djawa. (**Fermentation experiments with Java Criollo cacao.**) [English summary ¼ p.]
Menara Perkebunan,* 1958, **27**: 61-70, bibl. 6.

In experiments on Criollo cacao the fermentation was carried out in 2 stages, viz. a first period during which the beans were held at a temperature of 35° C., followed by a second period during which they were held at 50° C. The time the cacao was held at 35° C. was varied from 12 to 84 hrs by 12-hr steps, and the time at 50° C. was varied from 12 to 72 hrs also by 12-hr steps. The shortest fermentation period was 24 hrs (12 hrs at 35° C. followed by 12 hrs at 50° C.), and the longest was 156 hrs. When the fermentation of a batch was concluded the cacao was washed by hand and dried in the sun. The dried cacao was examined for:—(*a*) percentage of broken shells, (*b*) percentage of round and wrinkled beans, (*c*) colour of cotyledons (on cross-section), (*d*) chocolate flavour and flavour as a beverage (cocoa powder dispersed in water). The following conclusions were reached:—1. Cacao fermentation cannot be adequately defined by giving the number of hours of fermentation only. For the development of flavour and quality the period during which the beans remain viable during fermentation is of major importance. 2. The quality of the cacao improved when the beans were kept alive for a relatively long period during fermentation; they started to lose viability after 48 hrs at 35° C. 3. It seems to be important that, once the stage is reached at which the beans slowly begin to lose viability, they should be killed quickly by raising the temperature. 4. The number of wrinkled beans only started to increase when low-temperature fermentation was prolonged beyond the point at which the beans lost their viability. 5. The number of hours of fermentation at 50° C. had a definite influence on the development of brown colour in the beans.

4067. Powell, B. D.
The rapid artificial drying of cocoa and chocolate flavour.
Trop. Agriculture Trin., 1958, **35**: 200-4, bibl. 10.

The rapid artificial drying, as distinct from the slow artificial drying or sun drying, of cocoa beans, after fermentation, causes an unwanted fruity flavour to appear in the subsequent chocolate. This is removed when adequate attention is given to the conching operation of factory processing [a step in chocolate manufacture preceding tempering and moulding], but it should be stressed that the degree of attention given does vary considerably between manufacturers. The flavour has been shown to be due to the presence of an excess of acetic acid and an explanation of the way in which this arises is given. [Author's summary.]—Cadbury Bros., Bournville, Birmingham.

4068. Spoon, W.
White spot in Ghana cacao. [Dutch, with English summary ½ p.]
Ber. Afd. trop. Prod. kon. Inst. Tropen **263,** 1958, pp. 5, bibl. 4.

White spots on the colourless membrane enveloping the cotyledons were found on bean samples, and were shown to be of a crystalline nature. Affected beans yielded a fat with a higher percentage of free fatty acids and a higher peroxide value than normal, and it is concluded that the fat had been hydrolysed and oxidized. It is suggested that bean fermentation and drying in abnormally dry atmospheric conditions may result in deterioration of the fats and the deposition of fatty acids on the cotyledonary membrane.

Coconuts.

(*See also* 4156o, 4157f.)

4069. Ynalvez, L. A., Covar, R. R., and Ocfemia, G. O.
Chemical analyses of cadang-cadang-infected coconuts, supposedly healthy palms from the cadang-cadang area and healthy trees from the College of Agriculture where the disease does not occur.
Philipp. Agric., 1958, **41**: 491-4, bibl. 2.

The Fe content of the unopened leaves, inflorescence and cabbage of cadang-cadang infected coconut palms is lower than that of the healthy palms. It is very low in the opened leaves. The P and K contents in the opened leaves of the diseased palms are slightly higher than those in the healthy coconuts from the College of Agriculture. There is no difference in the Cu content of the cadang-cadang-infected and normal coconuts. There is little difference in the B content of the healthy and diseased coconuts. [Authors' summary.]

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* Formerly *De Bergcultures.*

4070. McKinlay, K. S.
Interim report on *Pseudotheraptus wayi* as a pest of coconuts.
Misc. Rep. colon. Pestic. Res. Unit **203**, 1958, pp. 21.

Preliminary results indicate that in wet weather *P. wayi* numbers are high, physiological shedding of immature nuts is low and therefore insecticidal treatment should increase yield. In dry weather insect numbers are reduced and physiological shedding is increased as the palms' ability to set fruit is low. Under these conditions less advantage results from spraying. Double applications of 0·75 lb./acre DDT, applied from aircraft as a coarse aerosol of a 10% w/v oil solution, has given good control, but the continued use of chlorinated hydrocarbon insecticides may lead to serious increases of scale insects.

4071. Marar, M. M. K.
When to harvest coconuts.
Coconut Bull., 1958, **12**: 69-71, illus.

In Kerala State copra and oil contents are highest in 12-month-old nuts, but, when superior coir fibre is also sought, nuts may be harvested when 10 to 11 months old.

4072. Childs, A. H. B.
Production of kiln-dried copra in the Tanga province of Tanganyika.
E. Afr. agric. J., 1958, **23**: 280-4, illus.

Plans and operational instructions are given for 3 types of kiln. In two the copra is spread on expanded metal above a fire pit in which shells are burned; in the third the copra is placed on trays above an enclosed flue. Capacities are 3,000, 2,000 and 3,000 nuts; time of drying 4, 1½ and 2 days; and building costs Sh. 500, Sh. 550 and Sh. 700 respectively.

4073. Sills, V. E.
The Devo copra drier.
Agric. J. Dep. Agric. Fiji, 1957, **28**: 68-71, illus.

In this drier, which is illustrated, about 1,100 lb. of fresh copra are placed on an enclosed metal tray situated above the fire. The smoke escapes past the sides of the tray and the moisture from the copra through a separate vertical outlet. The copra may be removed after 36 hours. This drier is said to need skilled management to produce the best results.

4074. Sills, V. E.
Copra drying experiments. I. Relationship between rate of drying and relative humidity.
Agric. J. Dep. Agric. Fiji, 1956, **27**: 99-101, bibl. 1 [omitted in error from *H.A.*, Vol. 27, No. 3].

Experiments are described in which copra was dried at 170° F. with normal dry air and with artificially moistened air. The use of moistened air resulted in quicker drying and a better quality product. The dry air caused hardening of the surfaces of the copra and this slowed down drying of the centres.

4075. Sills, V. E.
Copra drying experiments. II. Effect of temperature on rates of drying.
Agric. J. Dep. Agric. Fiji, 1957, **28**: 72-6, bibl. 1.

Samples of fresh copra were dried under laboratory conditions in forced draught at temperatures between 140° and 170° F. for 22 hours. Adverse colour changes occurred above 145° F., but it was shown that higher temperatures could be usefully employed without adverse effects for the first 2 to 4 hours. The second stage of drying was completed at 95° F. and samples were dried to 7% moisture in a further 3 to 4 days regardless of previous treatment. The moisture gradient within the copra pieces was much the same at low and high drying temperatures, viz. about 4% moisture difference after 22 hours between the centre and outside. Little or no case hardening occurred at temperatures up to 170° F.

4076. Cassidy, N. G.
The sampling of copra in Fiji in relation to its moisture content.
Agric. J. Dep. Agric. Fiji, 1956, **27**: 96-8 [omitted in error from *H.A.*, Vol. 27, No. 3].

Toplis-Simpson Electric Meters have been found to give satisfactory readings of moisture content in copra, provided certain precautions, which are described, are taken. To obtain an accuracy of ±10% 8 sacks must be sampled from each consignment. When both wet and dry copra samples are exposed to the atmosphere (with 70–80% R.H. at Suva) they tend fairly quickly to come to the same equilibrium value of about 7% moisture.

Coffee.

(*See also* 4156v, 4157h, k-m.)

4077. Kenya Coffee Board.
Annual report and accounts of the Coffee Board of Kenya for the year ended 31st March, 1958.
Mon. Bull. Coffee Bd Kenya, 1958, **23**: 122-31.

Reports of research work include the following: *Field investigations:* Clean weeding throughout the rains caused substantial yield increases. Chemical weed control is equally beneficial, but a PCP-fortified oil emulsion herbicide caused taint. Dalapon and 2,4-D gave good general control, the former being also effective against couch grass. Mulches unexpectedly did not increase yields but 2 ndebe [8 gal.] per tree of composted FYM caused increases. Once again P did not increase yield but N in various forms was effective. Anti-leaf-fall spraying markedly reduced biennial bearing and increased yields. Vegetative propagation studies showed that wedge-shaped, nodal cuttings, 2 nodes long, prepared from semi-ripe wood, were best. Indolebutyric acid powder caused earlier but not greater rooting. Vinyl resin (VL 600) sprayed on the leaves of cuttings to minimize moisture loss also caused earlier rooting but not a higher percentage. *Plant pathology and physiology:* Studies on *Hemileia vastatrix* are described. Raising the concentrations of Perenox and burgundy mixture considerably enhanced control. *Agricultural chemistry:* Studies of soil N and the influence of rainfall and temperature are outlined. Mg deficiency was related to the use of grass mulches which increased soil K. *Entomology:* Control of leaf miners with diazinon and malathion, antestia with malathion, lacebug with parathion emulsion concentrate at 0·05% active ingredient, and white borer with ½% dieldrin. *Coffee processing:* Artificial drying.

4078. Satyanarayana, M. C.
Cost of production of arabica coffee in India.
Indian Coffee, 1958, **22**: 131-6.

Costs of producing coffee compiled from returns from 71 large estates (each over 100 acres) for the 8 seasons 1949/50 to 1956/57 are summarized. Over 36% of the total expenditure was used for cultivations, manuring and spraying and 16% was spent on salaries, welfare and office expenses. Gross return on the estates (before taxation) was 17%. The cost of production per acre rose during the period, but the cost per cwt. of coffee produced fell from 1952/53 onwards. J.R.L.

4079. Carvalho, A., and Monteiro Salles, F. J.
A influência do tamanho da semente de café na germinação e crescimento das mudas. **(The effect of coffee seed size on germination and growth of seedlings.)**
Bol. Super. Serv. Café, S. Paulo, 1957, **32** (370): 11-20, illus.

Classification of coffee seed either by size or by weight was equally accurate whether done before or after the removal of parchment. Germination percentages for October-harvested large, small and moca seeds of Mundo Novo coffee sown a month after harvesting were not significantly different, and the same applied to April-harvested Yellow Bourbon seeds sown in October. Speed of germination was slower than in large Mundo Novo seeds, but was unaffected by size in Yellow Bourbon. Seedling height after 6 and 9 months was significantly greater in Mundo Novo than in Bourbon, but seed size had a positive effect only in the latter variety.

4080. Genkel', P. A., and Chao, T.-S.
The role of plasmodesma in the loss of germinating power in coffee (*Coffea robusta*) seeds. [Russian, with English summary 5 lines.]
Fiziol. Rast., 1958, **5**: 305-9, bibl. 17, illus.

The rapid loss of viability in the seeds of coffee and other plants, which do not possess a dormant period, is related to the deformation of the plasmodesma in both the endosperm and embryo cells, which occurs during drying.

4081. Loo, T. G., and Jakobs, H.
Course of CO_2 release by living coffee beans.
Menara Perkebunan,* 1958, **27**: 111-16, bibl. 2, illus., and *Planter, Kuala Lumpur*, 1958, **34**: 418-22, 424.

Losses of CO_2 by respiration of unbroken robusta beans and of broken excelsa beans held at 6 temperatures were measured by absorption in a sodium hydroxide solution. With unbroken beans the rate of CO_2 loss increased with temperature up to about 49° Celsius, but between 50° and 58° it virtually ceased. At 30° the loss over 48 hours was 1·22%, at 39° 1·64%, and at 47° 1·95%. With broken beans the loss was greater but less dependent on temperature; at 30° it was 3·07%, at 39° 1·86%, and at 49° 2·40%.—Exp. Stat. C.P.V., Bogor.

4082. Rocha de Medina, A.
Sistema de plantação. Número de cafeeiros em cada cova e número de hastes em cada cafeeiro. **(Planting system. Number of coffee trees per planting hole and number of branches per tree.)**
Rev. Café portug., 1957, **4** (16): 16-24.

Preliminary experiments were carried out on planting robusta coffee on savanna land in Angola, with 1 tree per hole, each bearing 1, 2 or 4 shoots, 2 trees per hole, each bearing 1 or 2 shoots, and 4 single-stemmed trees per hole. Shade trees were planted at the same time. Over the first 6-year period the highest yield was from 1 tree per hole, with a single stem. The next best result was from the traditional system of 1 tree with 4 shoots per hole.

4083. Pagacz, E.
Une modalité nouvelle de la conduite du caféier robusta en multicaulie. **(A new method of managing robusta coffee on multiple stems.)**
Bull. Inf. I.N.E.A.C., 1958, **7**: 165-79, illus.

A method is described in which the plantation is divided into 4 equal parts and pruned on a 4-year cycle. Each year the trees in one part are cut back to a stump immediately after harvest. One branch is chosen as a "sap-drawer" and allowed to remain uncut until the end of the first year. Six young shoots are allowed to grow and these are reduced to 4 at the beginning of the 3rd year. One of these becomes the "sap-drawer" when the next pruning takes place at the beginning of the 5th year. The system is flexible and details of production are given.

4084. Hatert, J.
Premières observations sur le système radiculaire du caféier robusta. **(Preliminary observations on the root system of robusta coffee.)** [Flemish summary 1 p.]
Bull. agric. Congo belge, 1958, **49**: 461-82, bibl. 5, illus.

The root systems of 130 trees were examined. In general, there is a straight taproot, sometimes forked, which can reach a length of 90 cm. and which becomes of less importance in older trees. A superficial system of lateral roots and numerous secondary roots form a dense and uniform mass around the tree over an area of 7–8 sq. m. With age local necroses cause the root distribution to become irregular. These result from damage by cultivation implements or through the withering of roots in exhausted portions of the soil while other roots colonize more favourable zones.

4085. Suárez de Castro, F., and Rodríguez G., A.
Pérdidas de suelo y agua bajo diferentes sistemas de cultivo. **(Soil erosion and run-off under different cropping systems.)**
Bol. téc. Fed. nac. Cafet., 1956, **2** (17): 1-80, bibl. 18, illus.

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* Formerly *De Bergcultures.*

Investigations covering 5 years have shown that in the central region of Colombia a dense-canopied or shaded coffee plantation is practically as effective as a forest for conserving soil and water. It is better than a pasture, which controls erosion but not run-off.

4086. CASTILLO Z., J.
Influencia de algunos tratamientos culturales sobre la calidad del grano de café. **(Effect of certain cultural treatments on the quality of coffee beans.)**
Cenicafé, 1957, **8**: 333-46, bibl. 10.

Compared with bourbon coffee, the seeds of typica are larger and rounder and a higher percentage are empty. Bourbon has the higher proportion of triangular seeds and this is increased by shade, as is the roundness of the normal seeds. With good soil fertility, yields are approximately equal in sun and shade, but on poor soils they are markedly lower without shade, especially in typica. The average yield is slightly higher in typica than in bourbon.

4087. CATANI, R. A., AND PUPO DE MORAES, F. R.
A composição química do cafeeiro. Quantidade e distribuição de N, P_2O_5, CaO e MgO em cafeeiro de 1 a 5 anos de idade. **(The chemical composition of the coffee tree. Content and distribution of N, P_2O_5, CaO and MgO in coffee trees 1–5 years old.)** [English summary ½ p.]
Rev. Agric. Piracicaba, 1958, **33**: 45-52, bibl. 7.

Composition figures are given, from analyses at half-yearly intervals, of coffee trees during the 2nd to 5th years of growth, including percentages of N, P_2O_5, K_2O, CaO and MgO in the roots, trunks, branches, leaves and fruits. These nutrients, except for Ca, showed higher concentrations in the leaves and fruits in January than in July. Increase of uptake with plant age was marked for N, P and Ca, but slighter for P and Mg. There was little seasonal variation in nutrient content of the roots, trunk and branches.

4088. ROBINSON, J. B. D.
Fertilizing coffee seedlings.
Mon. Bull. Coffee Bd Kenya, 1958, **23**: 181-2, 188.

The substitution of urea for ammonium sulphate for fertilizing newly established coffee seedlings caused the death of numerous plants and a coarse mottled chlorosis followed by dieback in others. Subsequent investigation showed that urea containing 2% or more biuret contamination was unsuitable, and also that urea should be applied thinly scattered over the surface of the soil and at least 2 in. away from the stem.

4089. ROBINSON, J. B. D., AND CHENERY, E. M.
Magnesium deficiency in coffee with special reference to mulching.
Emp. J. exp. Agric., 1958, **26**: 259-73, bibl. 40, illus.

The magnesium-deficiency syndromes for arabica and robusta coffee are described in detail. Distribution of Mg and K in twigs of trees treated and not treated with grass mulch or coffee husk are presented. The critical level of Mg, below which the syndrome is likely to occur and the leaves drop prematurely, is about 0·20%, although many cases are cited where the Mg content was below 0·10%. The critical ratio of K to Mg in leaves is about 10 to 1. Mulching treatments have a strong tendency to induce Mg deficiency by supplying an excess of antagonizing K. Fe chlorosis is frequently associated with Mg deficiency for the same reason. Mg levels are maintained, or even raised, in cherry, despite deficiency in the tree. Mg deficiency occurs chiefly in older leaves in whose axils flowers or cherries are developing. Remedial measures are suggested. [Authors' summary.] These measures are Epsom salts sprays and, perhaps less effectively, soil treatment with Epsom salts, kieserite or dolomite. Mulching should be maintained, in spite of deficiency symptoms, because of its manifold agricultural value. In heavily mulched plots the correction of Mg deficiency may be expected also to correct any Fe chlorosis present.—Coffee Res. Stat., Ruiru, Kenya, and Agric. Res. Stat., Kawanda, Uganda.

4090. SHOJI, K., AND OTA, R. M.
Zinc deficiency of coffee.
Hawaii Fm Sci., 1958, **6** (4): 3, illus.

Sprays of zinc sulphate, with or without boric acid, resulted in a marked recovery of young coffee trees, which showed severe Zn-deficiency symptoms and some signs of B deficiency, within 4 to 8 weeks. Sprays of boric acid were less successful in correcting deficiency symptoms. Leaf analyses confirmed that Zn was deficient in the affected trees, but indicated that B and other elements were present in adequate amounts. In areas of Zn deficiency normal growth may be maintained by zinc sulphate sprays applied at intervals of 3 to 4 months.

4091. BITANCOURT, A. A.
Um inquérito sôbre a sêca dos ramos do cafeeiro. **(An investigation on dieback of coffee branches.)**
Biológico, 1958, **24**: 19-22.

A survey suggests that the die-back of coffee branches, which affects only those that are fruiting, is a result of malnutrition, generally associated with inadequate or unbalanced fertilizer application and poor root growth. Anthracnose, caused by *Colletotrichum coffeanum* and bacterial leaf scorch, due to *Pseudomonas garcae*, can also be controlled to some extent by balanced fertilizing.

4092. (ABRAHÃO, J.)
Comprova-se que o estrangulamento da haste dos cafeeiros é fenômeno fisiológico causado pelas correntes de ar frio. **(Stem strangulation of coffee trees has been proved a physiological disorder caused by cold air currents.)**
Fôlha da Manhã, 6 Nov. 1957, summarized in *Bol. Super. Serv. Café, S. Paulo*, 1957, **32** (370): 43-5.

The symptoms, confined to new plantations and appearing at the beginning of the rainy season, include yellowing and withering of leaves, followed by drying of the ends of branches and the upper part of the trunk due to death of the inner bark. Cold winds and temperatures near or below 0° C. are responsible. Suggested treatments are:—opening up the planting holes and removing soil as far down as the highest roots; removing the crown, cutting off the trunk about 2 cm. below the affected region; disbudding in the following rainy season, leaving in general only 2 rather spreading shoots.

4093. Bianchini P., C. L.
Las llagas del café en Costa Rica. **(Canker diseases of coffee in Costa Rica.)** [English summary 1 p.]
Bol. téc. Minist. Agric. Costa Rica **21,** 1958, pp. 30, bibl. 30, illus.

Pathogens jointly involved in white root rot were species of *Trichoderma*, *Rosellinia*, an unidentified green fungus and possibly 2 bacteria. Soil treatment with aqueous solutions of Fermate gave reasonably good control of white root rot. Less effective control was given by tribasic copper sulphate, bordeaux mixture and Perenox, in descending order.

4094. Nutman, F. J.
Coffee berry disease.
Mon. Bull. Coffee Bd Kenya, 1958, **23**: 121.

Recommended control is one spray 6 weeks before flowering is expected, followed by 3 or more others at intervals of 3 to 4 weeks, using 4½ lb./acre of a formulation containing 50% captan in about 200 gal. water. The estimated value of additional crop resulting from this schedule is given. [For earlier work on the control of this disease see *H.A.*, 28: 1880.]

4095. Cohic, F.
Le "scolyte du grain de café" en Nouvelle-Calédonie. **(The coffee berry borer in New Caledonia.)**
Café, Cacao, Thé, 1958, **2**: 10-14, bibl. 1.

Gammexane 50 w.p. sprayed on robusta, Gammexane 3% dust on arabica, S.P.C. 25 on robusta and parathion on both varieties gave effective control. A second application after 15–20 days was necessary. Difficulties of terrain hinder wide-scale control.

4096. McCrae, D. J.
The control of coffee lacebug.
Mon. Bull. Coffee Bd Kenya, 1958, **23**: 153-4, illus.

Two species of lacebug are found in E. Africa, *Habrochila ghesquierei* mostly on arabica and *H. placida* at lower altitudes and mostly on robusta. The only predator of importance is *Stethoconus* sp., a mirid bug, which is more sensitive to DDT sprays than the lacebug. The life history and damage are described. Since the eggs are not easy to destroy, control largely depends on applying a second spray 21 days after the first so as to kill newly-hatched nymphs before they themselves begin to lay. Parathion, 0·05% active ingredient, or malathion, 0·15% a.i., are effective sprays. Airspraying 2 pints of the concentrate per acre [see also *H.A.*, 28: 3083] was not as effective as ground spraying, but is useful for the first spray as a rapid means of arresting damage. DDT should be avoided as a foliage spray.

4097. da Fonseca, J. P.
O *Cerococcus* do cafeeiro. ***Cerococcus* scale of coffee.)**
Biológico, 1958, **24**: 23-5, illus.

Cerococcus catenarius, a coffee pest new to the São Paulo region of Brazil, is described. The liquid recommended for spraying is 1% mineral oil emulsion mixed with a solution of 200 g. of soap in 3 l. of hot water, to be applied immediately the larvae emerge, and repeated twice more at 15–20-day intervals.

4098. Sleep, K. C.
The persistence of insecticides on coffee leaves.
Misc. Rep. Colon. Pestic. Res. Unit **204,** 1958, pp. 13, bibl. 5.

DDT deposits were greater on the leaves of the lower half of the tree than on those of the top. Shade had no significant effect on rate of loss of deposit, nor was this particularly dependent upon hours of sunshine. Of 5 insecticides tested the order of persistence was: DDT (e.c.), DDT (w.p.), dieldrin (e.c.), dieldrin (w.p.) and aldrin (w.p.). Mortalities of *Antestia* showed that the wettable powders of DDT and dieldrin were also less biologically persistent than the emulsifiable concentrates. Dieldrin was more toxic than DDT. Rainfall appeared to reduce insecticidal residues. Regression equations for the various insecticides used are given and compared statistically.

4099. Fukunaga, E. T.
A new mechanical coffee demucilaging machine.
Bull. Hawaii agric. Exp. Stat. **115,** 1957, pp. 18, bibl. 15, illus.

This machine, which is described and illustrated, consists of a steel beater, designed like a domestic food mixer, in one side of a U-tube through which coffee and water flows. Powered electrically, it deals with 3,000 lb. cherry per hour.

Mangoes.

4100. Young, T. W.
Mango research on sandy soils.
Proc. 17th annu. Mtg Fla Mango Forum, 1957, pp. 26-30, bibl. 3.

The Sub-tropical Experiment Station, Homestead, started investigations in 1954 on problems concerned with mango production on sandy coastal soils in southern Florida. Progress to date is outlined on these investigations, which include: *Nutrition:*—Several manurial trials on bearing trees are now in their fourth year, but so far no significant yield responses have been obtained. *Pollen viability:*—It has been found that mature pollen can be kept at temperatures down to 32° F. without loss of viability but will show little or no germination at 59° F. or below. This, however, would not adequately explain the crop failures that frequently occur with some varieties. The possibility is now being investigated that low temperatures (below 40°) occurring in the formative stage of the pollen may affect its viability several weeks later. *Rootstocks:*—A trial has been established with 3 varieties worked on 6 rootstocks. *Soft-nose of mango fruits:*—For a more detailed report of investigations on this disorder see *H.A.*, 28: 3092. *Disease control:*—Powdery mildew (*Oidium* sp.) has been controlled by 2 applications of either 8 lb. sulphur or 1 lb. karathane per 100 gal.

4101. Hosein, I.
Mango propagation by a "T" graft method.
Trop. Agriculture Trin., 1958, **35**: 181-9, bibl. 3, illus.

The stocks should be about 4 months old and at least ¾ to 1 in. in circumference at 3 in. above ground level. Scions are selected from terminal shoots 3 to 4 in. long and slightly thinner than the stocks. They are defoliated 8–10 days before removal, so that the petioles may fall naturally. A sloping cut is made from a point ½ in. below the terminal bud to at least 1½ in. below it on the other side. This is inserted into a "T" cut in the bark of the stock, which is 1½ to 2 in. long and half the circumference wide, and above which a chip of bark is removed to facilitate a close fit. The whole is tied with raffia and wrapped with resinite or polythene tape. The stock is cut back gradually over 3 months. Care in lifting and planting out is essential. The method costs only 23% of the cost of conventional inarching and takes less than half the time.—Dep. Agric., Trin. Tob.

4102. Bharath, S.
Mango propagation—a modified system of approach grafting.
Trop. Agriculture Trin., 1958, **35**: 190-4, illus.

The stocks used are 6-week-old seedlings, 6–9 in. tall, lifted and wrapped in moist moss enclosed in polythene to prevent drying out. They are tied to the scion and approach grafting done in the usual way, the junction being tied with raffia and taped with polythene. Union is effected in 4 weeks during which no attention is needed. The plants are then cut from the scion tree, potted and hardened off for 1 month under partial shade.—Dep. Agric., Trin. Tob.

4103. Simão, S.
Inflorescência da mangueira. (**Mango inflorescences.**) [English summary ½ p.]
Rev. Agric. Piracicaba, 1958, **33**: 35-8, bibl. 7.

Statistical studies were made of numbers and proportions of fertile and sterile flowers produced by 33 mango varieties. Factors other than this must, however, affect production, as the variety Itamaracá Primavera, highly productive in its native region, gave very poor results in São Paulo.

4104. Wolfenbarger, D. O.
Insects in relation to fruitset of mangos.
Proc. 17th annu. Mtg Fla Mango Forum, 1957, pp. 11-13, bibl. 3.

Honey bees visiting mango flowers were as prevalent at distances of 400 to 800 ft as within 100 ft of a 13-colony apiary. Fruit set per tree was practically as great at one distance as at another up to 1,500 ft from the apiary. Flower thrips [*Frankliniella cephalica*] were reduced by spray applications of dieldrin, endrin and parathion to mango flowers. Fruit set was not related to thrips abundance nor to insecticidal applications. [From author's summary.]—Sub-trop. Exp. Stat., Homestead, Fla.

4105. Blank, H.
Dermatitis from Anacardiaceae.
Proc. 17th annu. Mtg Fla Mango Forum, 1957, pp. 24-6, bibl. 5.

Many people in the U.S.A. are allergic or hypersensitive to the native plants poison ivy (*Rhus toxicodendron*=*R. radicans*) and poison oak (*R. diversilobus*). Once such an allergy has developed the persons in question may react adversely when they touch a mango or other anacardiaceous fruit which contains the active principle 3-pentadecylcatechol (PDC). In a test involving 66 people, all who proved allergic to mango sap were also allergic to poison ivy, but not all those who were allergic to poison ivy reacted to mango sap. The theory that exposure to mangoes early in life may prevent the development of allergy to poison ivy is being investigated. It is also proposed to study the structure of the PDC in the mango, because it has been shown that this chemical differs in structure in different anacardiaceous species.—Univ. Miami Sch. Med.

Oil palms.

(*See also* 4156j, 4157p, 4178.)

4106. Hussey, G.
An analysis of the factors controlling the germination of the seed of the oil palm, *Elaeis guineensis* (Jacq.).
Ann. Bot. Lond., 1958, **22**: 259-84, bibl. 22, illus.

Under natural conditions in West Africa, at the average ground temperatures of 25–30° C., oil-palm seed germinates sporadically over a period of years, but with continuous heat treatment (38–40° C.) 50% germination of either nuts or extracted kernels occurs within a few months. The excised embryo is non-dormant and at 30° C. starts to elongate within 24 hours, either on moist filter paper or while still in contact with the endosperm. At 30° C. removal of the operculum is followed by sluggish emergence of the embryo in air; emergence at the normal rate occurs in pure oxygen, or in air if a long period at high temperature precedes de-operculation. Fresh intact kernels remain ungerminated for at least 6 months at 30° C., either in air or in pure oxygen. At high temperature (40° C.) intact kernels germinate faster in pure oxygen than in air; at 30° C. the same applies only after previous treatment at high temperature. This accelerating effect of oxygen is shown to be dependent upon the progress of slow processes stimulated by high temperature. It is postulated that germination of oil-palm seed is dependent upon a minimal threshold concentration of oxygen in the embryo and that during dormancy this minimal level progressively decreases at a rate depending on the temperature. [From author's abstract.]—W.A.I.F.O.R., Nigeria.

4107. Boatman, S. G., and Crombie, W. M.
Fat metabolism in the West African oil palm *Elaeis guineensis*. Part 2. Fatty acid metabolism in the developing seedling.
J. exp. Bot., 1958, **9**: 52-74, bibl. 23, illus.

During germination in the light, the endosperm, containing a high proportion of reserve fat (composed largely of shorter-chain (C_8 to C_{14}) saturated fatty acids), is slowly invaded by the expanding haustorium (cotyledon). Free fatty acids accumulate in the endosperm, preferential hydrolysis of longer-chain saturated acids (C_{14} to C_{18}) occurring under conditions of slow growth. Lipids are absorbed by the haustorium, the process being superficially similar in certain respects to intestinal fat absorption. When complicating factors are removed, absorption is found to be unselective during disappearance of 75% of the endosperm lipids. Amounts of lipid in the haustorium are low compared with the high concentration in the surrounding endosperm, and, before photosynthesis starts, losses through respiration account for a large part of the reserves which disappear. No free fatty acids are present in the haustorium. Breakdown of fatty acids is relatively unspecific, although the acids characteristic of the haustorium (C_{16}, C_{18}, oleic and linoleic acids) are metabolized somewhat less rapidly than the shorter-chain saturated acids (C_8 to C_{14}) characteristic of the endosperm fat. Both root and shoot have a low fat content. The fatty-acid composition of the former changes little during growth, but in the shoot linolenic acid increases proportionately during leaf expansion in the light. [Authors' summary. For Part 1 see *H.A.*, 26: 4184.]—Univ. Southampton.

4108. Crombie, W. M., and Hardman, E. E.
Fat metabolism in the West African oil palm *Elaeis guineensis*. Part III. Fatty acid formation in the maturing exocarp.
J. exp. Bot., 1958, **9**: 247-53, bibl. 11.

Accumulation of fat in the oil-palm exocarp is delayed until the kernel has almost finished developing (at about 19 weeks after pollination) and is then extremely rapid, a major part of the lipid being formed within a single week. Throughout the period studied (8 to 20 weeks after pollination) the fat-free dry weight remains approximately constant and carbohydrates (starch, sucrose, and reducing sugars) do not accumulate either prior to or during fat formation. Immature exocarps contain only a low proportion of fat (about 1% of the dry weight) and this "protoplasmic" lipid has a different fatty acid composition (major components palmitic and linoleic acids accompanied by smaller amounts of stearic and linolenic acids) from the later-formed oil (major components palmitic and oleic acids with smaller amounts of stearic and linoleic acids). There is no evidence of fatty acid interconversions at any stage of development. [Authors' summary.]—Univ. Southampton.

4109. Haines, W. B.
Manuring of crops. Oil-palm.
A.R. Rothamsted exp. Stat. 1957, 1958, p. 56.

In West African oil-palm experiments the yields of individual palms have shown a very distinct rhythmic cycle, peak yields generally occurring every 3 years. The average peak yield for each palm has been about 80% greater than the mean yield for the palm. It is suggested that this cycle is due to the fruiting phase having a shorter natural period than the weather. When the fruiting phase and suitable weather coincide, then peak yields are likely to be produced. In the experiments the cyclic rhythm has not been influenced by manuring treatments, by the sites used or the variety of palm grown.

4110. Prevot, P., and Ziller, R.
Relation entre le magnésium du sol et de la feuille de palmier. **(The relation between magnesium in the soil and in the palm leaf.)**
[English summary 10 lines.]
Oléagineux, 1958, **13**: 667-9, bibl. 4.

The water-soluble Mg content of the top soil (0–20 cm.) showed a close correlation with the leaf content of Mg and with visual deficiency symptoms. Top soils containing 15 p.p.m. water-soluble Mg are considered to be too low in Mg for oil palm culture.—I.R.H.O.

4111. Bachy, A.
Le "blast" des pépinières de palmier à huile.
(Blast in oil palm nurseries.)
Oléagineux, 1958, **13**: 653-60, bibl. 4, illus.

Symptoms of blast are described, and work on its occurrence is reviewed. In a series of 12 experiments by the I.R.H.O., blast was reduced by growing seedlings in baskets placed on top of the soil or above it on a platform. When the baskets were sunk in the ground losses were heavy. Shading the nursery from the beginning of October until the end of February was also effective in reducing the percentage of blast in seedlings.

Papaws.

(*See also* 4156e.)

4112. Agnew, G. W. J.
Grow early papaws with irrigation.
Qd agric. J., 1958, **84**: 221-3, illus.

Irrigation during a dry spring, at 2 in. per application with 5 irrigations between August and December, advanced flowering and, in November, the irrigated plots had 4 times as many flowering trees as the un-irrigated. The April–June crop was increased by 80%, and amounted to 1½ tons/acre. However, in the following October, the normal peak month, the irrigated plots had fewer fruits than the controls. Irrigation lengthened the harvest period, improved quality and caused more fruit to be harvested at times of scarcity and high prices.—Maroochy Exp. Stat.

4113. Lange, A. H., and Holtzmann, O. V.
Papaya responds to soil fumigation.
Hawaii Fm Sci., 1958, **6** (4): 6-7, illus.

Several nematocides have improved papaw growth and/or yields in greenhouse and field experiments [see also next abstract]. In one replant area Nemagon (at 140 lb. per acre) increased yields by 154·4%. In another replant soil Vapam and methyl bromide treatments were followed by better growth, but Nemagon and DD were ineffective. Where nematodes (*Rotylenchulus reniformis*) are the primary cause of poor growth, applications of Nemagon, DD or EDB are recommended. In other conditions methyl bromide may be effective.

4114. Lange, A. H.
Response of papaya to soil fumigation.
Down to Earth, 1958, **14** (1): 4-5, illus.

In land infested with *Rotylenchus reniformis* improved growth of papaw resulted from pre-planting soil fumigation with Dowfume MC-2 at ½ lb. per 100 sq. ft. In another experiment greatly increased papaw yield resulted from fumigation with 1,2-dibromo-3-chloropropane at 8 gal. per acre. D-D at 20 and 40 lb. per acre also gave an early response, but, thereafter, nematode build-up was rapid. On a poorly-drained area fumigation with methyl bromide at 1 lb. per 100 sq. ft gave the best results, but in other trials on similar heavy, poorly-drained land Dowfume MC-2, Picfume (chloropicrin) and Vapam were the only fumigants to show promise. In some of the trials significant increases in growth were not followed by significant increases in yield, which suggests that factors other than nematode control may be involved.—Hawaii agric. Exp. Stat.

Pineapples.

(*See also* 3599, 4156q, s.)

4115. Py, C., and Pélegrin, P.
Prévision de récolte en culture d'ananas. **(Forecasting pineapple yields.)**
Fruits d'Outre Mer, 1958, **13**: 243-51, bibl. 2, illus.

For the variety Baronne de Rothschild a close correlation has been established between the weight of a specific leaf "D" at the time when acetylene or flowering-hormone treatment is given and the weight of the fruit reaped 5½ to 6 months later. The selection of leaf "D" is described; it is the youngest adult leaf; and the relationship holds true for harvests obtained at different periods. But it is probable that for other varieties and other regions further studies will be needed.—I.F.A.C.

Rubber trees.

(*See also* 4156w, x, 4157d.)

4116. Rubber Research Institute of Malaya.
Brief report for 1956, 1957, pp. 15, cyclostyled.

Research in progress includes: *Botanical division:* Breeding and selection, tapping experiments and yield stimulation, vegetative propagation, cover cropping. *Soils division:* Manurial and cultivation experiments, analyses of leaf and bark, soil investigations including minor elements. *Pathological division:* Various diseases are under investigation.

4117. Langford, M. H.
The status of hevea rubber planting material for use in tropical America. [Spanish summary 14 lines.]
Turrialba, 1957, **7**: 104-10, illus.

Low yields from Eastern clones budded with *Dothidella*-resistant tops are attributed to slow-growing or unsuitable tops, damage from other diseases or from wind, and budding too low. Under favourable conditions yields from such trees are comparable with those from Eastern clones with their own tops. Results are quoted from Panama, Guatemala and Brazil. A budding height of 4½ ft gave markedly poorer yields than one of 6½ ft and there was some advantage in extending the height to 8½ ft. The dry rubber content of latex averaged 28% from Eastern clones with their own tops and 24% from those with Ford tops. Blight-resistant clones selected from crosses are now replacing top-budded trees, and present the advantages of lower cost, quicker establishment, greater uniformity of stands, higher wind resistance and less panel decay from *Phytophthora*. Yields from the best of these are 10–15 lb. of dry rubber per 8–10-year-old tree, i.e. 5 times as high as from blight-resistant clones derived from wild seed. Suitable clones are recommended for Mexico, Central America and the northern areas of South America. Some of these are relatively tolerant to *Phytophthora* leaf fall and dieback.

4118. Garot, A.
Padi sebagai tanaman sela (catch crop) pada tanaman ulangan karet di kebun Tjikumpaj. **(Rice as a catch crop on a newly planted rubber estate at Tjikumpaj.)**
Menara Perkebunan,* 1958, **27**: 123-7, illus.

In a preliminary experiment young rubber and rice are growing well together, the rubber showing 40–60% better growth and coming into tapping ½–1 year earlier than plants of the same clone which are not being intercropped. The rice crop more than paid for the cost of cultivation.

4119. Beaufils, E. R.
Le diagnostic physiologique. I. Sa position comme méthode d'estimation des besoins des plantes en éléments nutritifs. **(Physiological diagnosis. I. Its status as a method of estimating plant requirements of nutrient elements.)** [English summary 14 lines.]
Rev. gén. Caoutch., 1958, **35**: 769-74, bibl. 13, illus.

The method is based on detailed studies of ratios of absorption and utilization of nutrient elements by individual plants over long periods and by progenies from individual plants of hevea, conforming to well defined criteria of health, yield and latex quality, and growing under various favourable conditions. Having established a set of norms, mainly from statistical analyses of composition figures for latex and leaves of different ages, the cause of any inferiority in health or in yield or quality of latex can generally be traced in plants growing under less favourable conditions. The advantages and limitations of the method are discussed.

4120. Bolle-Jones, E. W.
Foliar diagnosis of mineral status of hevea in relation to bark analysis.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 109-27, bibl. 7.

An evaluation of the variation in the concentration of mineral nutrients in the laminae of young rubber plants during the day, showed that a significant diurnal variation occurred only in respect of Mg; there were indications, but not proven, that a diurnal variation in Fe concentration also occurred. Leaf sampling procedures are described and discussed in relation to diagnosis based on the composition of bark. The effects of fertilizer addition on the mineral status of the tree were assessed, in 3 manurial trials, in terms of bark and lamina composition. It was concluded that bark composition offered a means of detecting responses to fertilizers containing P and K, almost as satisfactory as that of the lamina. Whenever a significant mean effect on yield of rubber produced per tree was attributable to the addition of P or K the composition of the bark was found to mirror this effect in terms of the concentrations of those elements. The concentrations of P, K and Mn in the lamina were closely correlated with the respective bark concentration; a similar relationship held for N and Ca in respect of samples taken from two out of the three trials examined. The concentration of Fe in the lamina was not correlated with that found in the bark. [Author's summary.]

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* Formerly *De Bergcultures*

4121. Bolle-Jones, E. W., and Mallikarjuneswara, V. R.
Cobalt: Effects on the growth and composition of hevea.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 128-40, bibl. 18, illus.

Rubber seedlings, in pot sand culture, were supplied with a very low, normal and high level of Co. Co was eliminated from the nutrient solution by a new nutrient purification procedure. Seedlings deprived of Co did not show any leaf symptoms but were shorter, of less girth and of lighter weight than those given a normal level of Co supply. Tomato plants, also grown under similar conditions, showed a decreased yield of fruit and of dry weight of plant as a result of restricted Co supply. A deficient supply of Co (not exceeding 0·00002 p.p.m. Co] sometimes decreased the concentrations of Ca and Fe in the roots but did not affect the concentrations of any of the large number of other nutrient elements examined, in the laminae, stems and petioles or roots. A greater concentration of Co occurred in the roots of rubber seedlings than in the laminae, which in turn showed a greater concentration than the stems and petioles. The concentration of Co in the roots may therefore provide the best and most easily determined index of Co status in the plant. A high level (0·25 p.p.m.) of Co in the nutrient tended to diminish growth below that obtained at the normal level (0·005 p.p.m.) of Co supply, but no severe Co toxicity effects were observed. [Authors' summary. For a preliminary account see *H.A.*, 27: 2922.]

4122. Bolle-Jones, E. W.
Molybdenum: Effects on the growth and composition of hevea.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 141-58, bibl. 12, illus.

Rubber seedlings, in sand culture, were supplied with Mo-deficient nutrients, in which N was supplied as nitrate or as a mixture of nitrate and ammonium ions. Other seedlings were grown at different levels of Mo, sulphate and Ca. Seedlings deprived of Mo or given a very low level of supply were shorter, of smaller girth and dry weight, and developed a marginal or tip scorch in the midstem and upper laminae. Increased sulphate level improved their growth despite the usually lowered Mo concentration in the laminae. Molybdenum-deficient plants, given N as nitrate ions, possessed smaller concentrations of chlorophyll and Fe in the laminae and of P, Ca and Fe in the roots, than those given Mo. Complete nutrient seedlings supplied with ammonium N contained a greater concentration of Mo in their roots and lower concentrations in their stems and laminae than those given nitrate only. Although not established beyond doubt, it appeared that under conditions of Mo deficiency the topmost storey of laminae contained a higher concentration of Mo than the second storey, in which the symptoms often first appeared. At normal and high levels of Mo supply the older laminae possessed a higher concentration than the younger ones. Mild symptoms of Mo toxicity were observed in the older leaves at the highest level of Mo supply. Increased Mo supply diminished the concentration of nitrate N within the laminae as well as the concentrations of S, P, Mg and K, but increased that of Mn. Increased sulphate supply diminished the concentration of Mo in the laminae; Ca had no significant effect but appeared to accentuate the severity of the symptoms of Mo deficiency. [Author's summary.]

4123. Bolle-Jones, E. W.
Zinc: Effects on the growth and composition of hevea.
J. Rubb. Res. Inst. Malaya, 1957, **15**: 159-67, bibl. 5, illus.

Symptoms of Zn deficiency were readily produced in rubber seedlings grown in purified sand when supplied with nutrients cleansed of Zn; Zn-deficient leaflets were characterized by a hook or claw appearance in the tender stage and later, when expanded, by a reduction in width of the lamina in proportion to its length. Seedlings deprived of Zn were shorter, of smaller girth and dry weight, and contained much less Zn per plant than seedlings given Zn. Analysis of stem and petiolar tissues might, with careful standardization of sampling procedures, provide a better index of Zn status than analysis of the laminae. A deficiency of Zn was accompanied by increased concentrations of N and P in the stems and petioles and of N in the roots; evidence of accumulation of Fe and Mn in all the shoot tissues was also obtained. [Author's summary.]

4124. Anon.
Control of pink disease.
Plant. Bull. R.R.I.M., 1958, No. 37, pp. 87-90, illus.

Branches up to 30 ft can be sprayed from the ground, others ignored. Bordeaux or a proprietary copper fungicide or Fylomac 90 at 0·5% or a tar acid fungicide may be used, but copper sprays should not be applied when the trees are in tapping. Certain clones are more susceptible than others and the disease does not occur on coastal alluvial soils. Control measures need to be applied only during the wet seasons.

Sugar cane.

(*See also* 3601, 4156a-d, g, h, t, u, z, 4157a, b, j, o, 4183.)

4125. Mauritius Sugar Industry Research Institute.
Annual Report of the Mauritius Sugar Industry Research Institute, 1957, 1958 pp. 100+xxiv, bibls, illus., also summarized in French in *Rev. agric. sucr. Maurice*, 1958, **37**: 72-114.

Progress reports on the following are included: *Cane breeding:* arrowing, crossing and selection, pre-release variety trials, methods of sampling cane for sugar analysis. *Nutrition and soils:* study of the organic acid constituents of cane juice, foliar and internode diagnosis. *Cane diseases:* investigations on the occurrence of the chlorotic streak pathogen in canes of dry localities, the influence of planting time on rate of natural infection and on mode of transmission; studies on ratoon stunting disease, including histo-chemical diagnosis and heat therapy, and on pineapple disease. *Cane pests:* control of *Clemora smithi* with chlordane, introduction of *Tytthus mundulus* as a predator of leafhopper in view of the possibility of Fiji disease being introduced via Madagascar. *Weed control:* investigations with substituted ureas and other new herbicides. *Cultivation:* post-release variety trials, land reclamation. Yield studies in relation to rainfall.

4126. CHARDON, F.
Man-day requirements for growing sugar cane.
Sugar J., 1958, **20** (12): 35, 38-9, 42-3, 46.

Increasing mechanization in Puerto Rico is reducing labour requirements, which in 1957 were 0·70 man-days per ton or 24·9 man-days per acre. Labour and cost analyses are given and ancillary problems of mechanization discussed.

4127. TABAYOYONG, F. T.
Sugarcane variety tests in the Victorias Milling district, 1954-55, and 1955-56 crop years.
Sugar News, 1958, **34**: 233-40.

As the variety H.37-1933 has proved susceptible to leaf scorch disease, some 68 local and foreign varieties have been tested. Of these a number proved superior to H.37-1933, including CP.29/116, H.39-3633 and Q.50 [see also *H.A.*, 28: 3121]. Details of performance of the various canes tested are given. Planters are urged to plant CP.29/116 between late July and late October so as to avoid heavy tasselling. It is resistant to most disease occurring locally, and, when planted at the correct time, gives satisfactory yields.

4128. TABAYOYONG, F. T., AND BASILA, F. A.
Variety × section of stalk for planting (2 × 3 factorial).
Sugar News, 1958, **34**: 173-8, bibl. 6.

Cane grown from the top sections of 10-month-old canes yielded better than that grown from the middle and butt sections. Germination was also earlier and better in setts from the top section. Variety Co.449 outyielded H.37-1933, but significant interaction between the stalk section used for planting and variety was confined to the number of millable stalks produced. —Victorias Milling Co.

4129. BURR, G. O., AND OTHERS.
Uses of radioisotopes by the Hawaiian sugar plantations.
Proc. int. Conf. peaceful Uses atom. En. 1955, 1956, **12**: 177-83, illus. [received 1958].

By supplying a particular leaf of variously aged sugar cane plants with C^{14}O$_2$, it was shown that translocation covered the whole of a large single-stalked plant in less than 18 hours, with high accumulation in the growing point. Competition for photosynthetic products was shown by similar treatment of a leaf of a 16-stalk plant, such investigation bearing on the problem of dead cane in dense, high-yielding plantations. In one plant the minimal rate of translocation from leaf to root was 43 cm. per hour. Translocation of radioactive 2,4-D applied at one spot on a sugar cane leaf was very limited and slow. Young plants growing in culture solution were given Rb^{86} for a week and 2 months later this was distributed throughout the plant in almost exactly the same proportion as K, showing that Rb^{86} may be used as an accurate index of K distribution. A method of weighing growing sugar cane plants by means of γ-rays from Co^{60} and an ion chamber is described. It is particularly valuable for standard plots in experimental work. A further use of Rb^{86} is in routine studies of water distribution in Hawaiian sugar cane soils. This procedure and another using Co^{60} are described.

4130. HLEAP FELDER, T.
Propiedades físicas y químicas de suelos con productividad conocida de caña de azúcar (*Saccharum officinarum* L.). **(Physical and chemical properties of sugar cane soils of known productivity.)** [English summary ¼ p.]
Acta agron. Palmira, 1957, **7**: 233-52, bibl. 13.

Studies covered 60 soils and their subsoils. Quantitative results are given for the pH, total N, water-soluble P, exchangeable bases (Ca, K, Mg and Na) and mechanical composition of these soils, which are grouped under high, average and low productivity. In general, heavy soils predominated in the highly productive, and light soils in the least productive, group. Average content of nutrient elements was not significantly different in the 3 groups, except that the medium group was higher in Mg and lower in Ca than the others. The optimal soil K content was 0·255 m.e. per 100 g.

4131. RÍOS B., B.
El abonamiento como factor de producción en el cultivo de la caña de azúcar. **(Manuring as a factor affecting production in sugar cane.)**
Vida agríc. (*Lima*), 1957, **34** (399): 99, 101-4, from abstr. in *Supl. bibl. Turrialba*, 1958, **8**, Abstr. 110/58.

Major-element effects, covering 5, 4 and 2 harvests respectively, were studied in 3 localities. The effectiveness of guano was increased nearly 3-fold by deep placement. N significantly increased cane yield, with a tendency to reduction of juice purity, and increased slightly the percentage of glucose and the susceptibility to attack by borers. The most satisfactory way of applying N was as a mineral-organic mixture. There were interactions between N and P and between P and K, so that yields were reduced when either P or K was applied alone. There was an indication that K reduced susceptibility to borers.

4132. SEN, S. C., AND PRASAD, R.
An approach on the formulation of manurial schedule of sugarcane crop: Foliage fertilisation—Part 1.
Indian Sugar, 1958, **8**: 75-8, bibl. 3.

In an experiment to compare soil and foliage applications of fertilizer, which was conducted in large drums, the growth of cane was more effectively increased by soil application, while juice quality was improved most by foliage application.—Nat. Sugar Inst., Kanpur.

4133. BARRETO DOMÍNGUEZ, R.
Experimento con nitrato de amonio en la zafra de 1956. **(Experiment with ammonium nitrate in the cropping season 1956.)**
Mem. XXX Conf. anu. Asoc. Téc. azuc. Cuba, 1956, pp. 35-8.

Ammonium nitrate was applied at 3, 2·5, 2 and 1·5 metric tons per *caballería* (13·42 ha.) to clayey sugarcane soil carrying a 3rd ratoon crop. Except for the lowest application rate there was a highly significant increase in cane yield compared with control plots receiving no N, but differences between the different rates of N were not significant. The sugar content of the cane was not significantly affected.

4134. Barreto Domínguez, R.
Experimento con agua de amonio en la zafra de 1956. **(Experiment with aqua ammonia in the cropping season 1956.)**
Mem. XXX Conf. anu. Asoc. Téc. azuc. Cuba, 1956, 39-42.

Aqua ammonia was used to supply N at rates increasing by 1,000-lb. stages up to 4,000 lb. per *caballería* (13·42 ha.) to a ratoon crop on clayey soil, and was applied by injection to depths of 4, 7 and 10 in. below the soil surface. At the 4-in. and 7-in. depths, sugar yields increased with each rise in application rate, but at the 10-in. depth the highest yields were obtained with 2,000 or 3,000 lb. of N per *caballería*. Total sugar yields for the 3 application depths were not significantly different. The best results were from 2,000 lb. injected to 10 in.

4135. Aravamudhan, P.
Effects of soil application of synthetic hormone to sugarcane.
Indian Sugar, 1958, **8**: 145-9, bibl. 3, illus.

Cornox-D (containing 2,4-D amine salt) was applied in water at 5, 10, 15 and 20 lb./acre to 6-month-old cane. The effects were not consistent, but the treatment appeared to decrease fibre %, to increase brix value of the primary juice and to cause stalk malformation.—Begg, Sutherland & Co., Marhowrah, Bihar.

4136. Wang, C.-S.
Spread and effect of chlorotic streak disease on the sugar cane varieties N:Co.310 and P.T.43-52. [Chinese, with English summary 1 p.]
J. agric. Ass. China, 1958, No. 21, pp. 33-40, bibl. 24.

A trial was started in 1953 in which setts from diseased and healthy stools of N:Co.310 and P.T.43-52 were planted. With both varieties length and diameter of stalks, sprouting of tillers, rate of growth, number of nodes per stalk and millable cane per hectare were better in the healthy than in the infected plots, but there was no difference in percentage germination. The percentage of flowering canes in the plots of healthy N:Co.310 plants was 12·5 in the plant cane and 51·8 in the ratoon crop; comparable figures from the diseased plots were 8·3% and 40·1%. The total cane yields for plant and ratoon crops, respectively, were 12·1% and 11·7% lower in plots of diseased N:Co.310 and 7·5% and 3·1% lower in plots of diseased P.T.43-52 than in the plots of healthy plants. Less than 1% of diseased plants were found in the plots propagated from healthy parent stools. Some diseased stools carried healthy shoots; the percentage recovery was higher in stools of P.T.43-52 than in stools of N:Co.310. Observations indicated that the virus had an incubation period and that symptoms generally appeared during the rainy season.—Tsungyeh Sugar Cane Improvement Station.
J.R.L.

4137. Steib, R. J., Forbes, I. L., and Chilton, S. J. P.
Heat treating method for controlling ratoon stunting disease.
Sugar J., 1958, **21** (1): 22-3, 26, 28, illus.

Investigations on ratoon stunting disease that have been carried out in Louisiana are reviewed. Attempts to find a local indicator plant have so far been unsuccessful; maize and Johnson grass carry the virus but do not show symptoms. There is some evidence that there may be different strains of the virus which require different temperatures for their destruction or inactivation. Cane varieties differ, not only in their tolerance to heat, but in the ease with which the virus can be eliminated. Thus, for example, C.P.36-105 was freed of disease by hot-air treatment at 58° F. for 8 hours, whereas in C.P.44-101 satisfactory control was only obtained at 59° F., a temperature which injured C.P.36-105. The results are tabulated of a number of trials, in which diseased and disease-free cane was compared as to yields of cane and sugar in both plants and first ratoons. Among 6 of the newer varieties 5 showed losses through the disease of 9 to 32% in the cane tonnage of plants and of 36 to 77% in the tonnage of first ratoons. Losses of sugar per acre were slightly lower, because the sugar contents of diseased cane were slightly higher than those of healthy cane. In the sixth variety, N:Co.310, ratoon stunting caused no reduction in the yield of plant canes and only a slight reduction in the yield of the first ratoons. Similar comparisons were made on 7 varieties that had formerly been important commercially, but had been given up through declining yields. In all cases except one, C.P.29-116, the control of the disease resulted in the varieties regaining much, if not all, of their former yielding capacity [see also *H.A.*, 28: 934].

4138. Egan, B. T., and Hughes, C. G.
Top rot can cause losses.
Cane Grs' quart. Bull., 1958, **22**: 35-6, illus.

Top rot, an advanced stage of red-stripe disease, occurs in tropical N. Queensland and especially in areas where the soil has a low water-holding capacity. It is most prevalent when rains follow an abnormally dry spring and early summer. Badila and particularly Q.67 are susceptible.

4139. Ramachandrachari, C., and Rao, N. V. M.
"Endrin" and your shoot borer problem.
Indian Fmg, 1958, **8** (1): 11, 16, illus.

Early shoot borer [*Chilotraea infuscatella*?] of sugar cane was largely controlled by 0·02% endrin sprayed during the 4th, 5th and 9th weeks of the crop: 40, 60 and 80 gal./acre were used respectively. Increased yield of cane over the control was 7·66 tons/acre. DDT at 0·32% also gave good results.—Sugarcane Res. Stat., Anakapalli.

4140. Sen, S. C., and Handa, D. R.
Application of hand refractometer in sugar industry. Part IV.—Western Region in Uttar Pradesh.
Indian Sugar, 1958, **8**: 51-63, bibl. 7.

A positive correlation was found between middle internode stalk brix and pol % primary juice, pol % primary juice and sugar % cane . sugar % cane and recovery % cane for different parts of the season, and these can be used for predicting recovery from figures of middle internode brix. Three ready reckoners for early, middle and late periods of the season are provided. —Nat. Sugar Inst., Kanpur.

4141. RAMANUJAM, D.
Selective harvesting.
Indian Sugar, 1958, **8**: 81-3.

Since the organization of cane harvesting by means of a preliminary brix survey, using hand refractometers, is difficult, lengthy and expensive, selective harvesting by variety was tried. This method, which depends on varietal differences in period of maturity, gave satisfactory results and proved cheap and expeditious.—Messrs. Begg, Sutherland & Co.

Tea.

(*See also* 4156i, k, n, y, 4157e, i, r.)

4142. TEA RESEARCH INSTITUTE OF EAST AFRICA.
Annual Report of the Tea Research Institute of East Africa for the Year 1957, 1958, pp. 39.

Survey manurial experiments: Responses to N continued to be obtained. In one shaded area there were responses to phosphate, to leaf-fall from *Grevillea* shade and to a phosphate: leaf-fall interaction. Urea has provided a satisfactory source of N in Uganda. *Growth and development studies:* A 6-in. tip appeared likely to be more satisfactory than an 8-in., and the gradual lifting of the plucking table more beneficial than occasional raising several inches at a time. *Pests and diseases:* Studies of *Armillaria mellea* damage after felling shade trees, and an eelworm survey. *Chemical department:* Work was confined to soil investigations including pH frequency distribution, water retention and manurial studies.

4143. MIKEŠIN, G. V.
Ecological-geographical requirements of tea in Central Asia. [Russian.]
Tr. Gl. bot. Sada AN SSR, 1956, **5**: 3-10, bibl. 15, from *Ref. Ž.* (*Biol.*), 1957, No. 18, Abstr. 78,329.

The main reasons for lack of success in tea growing in the Central Asiatic republics appears to be incorrect choice of sites and ignorance of cultural methods under local conditions. To study these problems a network of experimental plots was established in 1950–1951 in the mountain regions of Tian-Shan, Pamir-Alay and Kopet-Dag. The geographical location of these plots ranges over 400 km. from north to south, 2,000 km. from east to west and from 800 to 2,200 m. above sea level.

4144. WOOD, D. J., AND BARUA, P. K.
Species hybrids of tea.
Nature, 1958, **181**: 1674-5, bibl. 4.

Chromatographic evidence indicated that comparatively simple crosses between *Camellia sinensis* and *C. irrawadiensis* show chromatogram spots for phenolic constituents characteristic of both species, whereas more complex crosses may fail to show spots characteristic of *C. irrawadiensis*. Chromatograms on Kingdon-Ward's No. 22839, originating in the Shan States, indicate that the plant is a hybrid between *C. irrawadiensis* and *C. sinensis* var. *assamica*. They also suggest that *C. irrawadiensis* exists in pure form in the Shan States and that uncontrolled crossing occurs between that species and *C. sinensis*.—Tocklai exp. Stat., Cinnamara, Assam.

4145. GOODCHILD, N. A.
Methods of selection and of vegetative propagation of tea.
Pamphl. Tea Res. Inst. E. Afr. **15,** 1958, pp. 13, illus.

The technique of propagation by cuttings is fully described. Cuttings consist of leaf, bud and internode taken from green or red wood. They are planted in nurseries under light shade and gradually hardened off after 18 months. Growth substances are not recommended. The selection of superior clonal mother bushes is discussed.

4146. HARADA, S., AND OTHERS.
Studies on the frost resistance of tea varieties. [Japanese, with English summary 2¼ pp.]
Bull. Tôkai-Kinki agric. Exp. Stat., Tea Div., 1958, No. 6, pp. 86-124, bibl. 45, illus.

Cut shoots of several tea varieties were tested in a refrigerator for frost resistance, and the refractive index (R.I.) of the sap was measured. In general the hardiness of a variety was found to be connected with the date of flushing, the water content of the leaves and the R.I. of the sap; the lower the water content and the higher the R.I., the hardier the variety. The sugar and N contents and the thickness of the leaves were not correlated with hardiness. Most, but not all, late-flushing varieties were hardy. Tests showed that the tissues along or near the vascular bundles were most susceptible to damage by cold. In the refrigeration tests the variety Asatsuyu suffered less damage than U19 but more than C22. Observations indicate that polyploid varieties tend to be more frost resistant than others. J.R.L.

4147. GOODCHILD, N. A.
***Armillaria mellea* (Vohl.) Fr.**
Pamphl. Tea Res. Inst. E. Afr. **16,** 1958, pp. 19-30, bibl. 9.

The control of *A. mellea* by ring-barking forest and shade trees so that they die slowly and exhaust their carbohydrate reserves before felling, has not proved fully effective in E. Africa. This paper discusses the problem and reaches the conclusion that ring-barking is still the best method provided it is carefully carried out so that only the bark is removed and the wood left intact, and the trees left until they are dead. Research continues on the use of arboricides.

4148. EZUKA, A.
Studies on Japanese *Exobasidium* blight of the tea plant. [Japanese, with English summary 2 pp.]
Bull. Tôkai-Kinki agric. Exp. Stat., Tea Div., 1958, No. 6, pp. 1-85, bibl. 37, illus.

Following attacks by Japanese *Exobasidium* blight of tea (*E. reticulatum*), which are most severe in Sept.-Oct., the weakened shoots become more susceptible to attacks by other fungi. This may result in 30–50% loss of crop at the first plucking in the following year. Inoculation experiments showed that only the young leaves are susceptible. The severity of attack varied with the variety, but Yabukita and Benihomare (the chief Japanese varieties) were both very susceptible. Attacks of the disease were not prevented by applying increased dressings of P or K fertilizers but were checked by omitting the third plucking. Effective control was obtained with copper fungicides, which were superior to mercuric preparations. [See also *H.A.*, 27: 2993w.) J.R.L.

4149. Zaprometov, M. N., and Kursanov, A. L.
A study of the formation and transformation of catechins in tea leaves by the use of labelled carbon. [Russian, with English summary ⅔ p.]
Fiziol. Rast., 1958, **5**: 310-19, bibl. 27.

When young tea shoots in the 3-leaf stage were exposed to light in an atmosphere containing $C^{14}O_2$ for 2 hours the major part of the absorbed C^{14} was incorporated in the predominant sugar, sucrose, and in simple catechins. On removing the shoots from light and $C^{14}O_2$, the radioactivity of the sucrose decreased but that of the simple catechins increased over the next 3 hours. Thereafter radioactivity decreased in the simpler catechins, and increased in the gallo-catechins. It is concluded that most of the sugar formed in young tea shoots is utilized in the synthesis first of simple catechins and then of gallo-catechins. [See also *H.A.*, 28: 3164.]

4150. Roberts, E. A. H.
The chemistry of tea manufacture.
J. Sci. Food Agric., 1958, **9**: 381-90, bibl. 36.

Many of the substances [notably polyphenols and caffeine] occurring in freshly plucked tea shoots are listed, and the chemical changes taking place during withering and fermentation are discussed. [From author's abstract.]—Ind. Tea Ass., Butler's Wharf, London.

Sundry crops.

(*See also* 4156f, 4157c.)

4151. Rao, V. N. M., Rao, I. K. S., and Hassan, M. V.
Studies on seed viability in cashew.
Indian J. agric. Sci., 1957 (issued 1958), **27**: 289-94, bibl. 2.

In germination studies [see also *H.A.*, 28: 1992], viability remained at over 90% for 7 months, and then fell rapidly to nil at 14 months. Time of germination was 13–14 days for the first 8 months, increasing to 22 days for older seed. Pre-soaking the seed for 24 hours somewhat improved the germination percentage and speed in older seed. Storage in tins kept seed viability high for 12 months, whereas the viability of seed stored in gunny bags declined within 6 months and fell to nil in 9–10 months.—Cent. Cashewnut Res. Stat., Mangalore.

4152. Rao, V. N. M., and Rao, I. K. S.
Studies on the vegetative propagation of cashew (*Anacardium occidentale* Linn). Approach grafting (inarching) with and without the aid of plastic film wrappers.
Indian J. agric. Sci., 1957 (issued 1958), **27**: 267-75, bibl. 10, illus.

By using rootstocks potted in alkathene wrapping, the cost of inarching was reduced and the season suitable for this work was extended. Eleven-month-old seedlings, 50–60 cm. in height and with a girth of about 4·5 cm. were used as rootstocks. Practically no watering was needed. The highest percentage success, from 40 to 75, was obtained between January and May.—Cent. Cashewnut Res. Stat., Mangalore.

4153. Rao, V. N. M., and Hassan, M. V.
Preliminary studies on the floral biology of cashew (*Anacardium occidentale* Linn).
Indian J. agric. Sci., 1957 (issued 1958), **27**: 277-88, bibl. 3, illus.

Observations were taken on 20 shoots on each of 5 trees from dormancy to fruiting. Records are presented and discussed of:—growth period and linear extension, leaf production, period and intensity of flower production, numbers of flowers and distribution of the two types, anthesis, time of stigmatic receptivity, anther dehiscence and pollen viability, fruit set, insect visitors and mode of pollination, and the effect of weather on blossoming. As regards pollination, only ants were seen to visit the flowers, but an increased fruit set was obtained by spraying with water at intervals of six days. Yield appeared to depend largely on the proportion of hermaphrodite flowers produced. These rarely occurred during the first month of flowering. Cloudy weather at flowering time also appeared to have an adverse effect on yield.

4154. Ammal, E. K. J., and Raghavan, R. S.
Polyploidy and vitamin C in *Emblica officinalis* Gaertn.
Proc. Indian Acad. Sci., Sect. B, 1958, **47**: 312-14, bibl. 2, illus.

Varieties of *Emblica officinalis* (*Phyllanthus emblica*) growing at Lucknow were found to be polyploids with chromosome numbers varying from 2n=98 to 2n=104. This is in contrast to the tetraploid 2n=28 described by Perry in *Amer. J. Bot.*, 1943, 30: 527. The vitamin C content, which ranged from 412 to 900 mg./100 g., was found to be directly proportional to the size of the fruit, and large fruit size was in turn directly related to chromosome number.—Cent. bot. Lab., Allahabad.

4155. Venkataraman, R., and Reithel, F. J.
Carbohydrates of the Sapotaceae. I. The origin of lactose in *A. sapota*.
Arch. Biochem. Biophys., 1958, **75**: 443-52, bibl. 25.

The sugars extractable from *Achras sapota* at varying stages of ripeness have been determined qualitatively and quantitatively. Lactose has been shown to occur only in ripe fruits of *A. sapota*. The data point to its derivation from oligosaccharides of the fruit. The oligosaccharides of *A. sapota* have been briefly described. [Authors' summary. See also *H.A.*, 26: 4255p].—Univ. Ore., Eugene.

Noted.

4156.

a Aiyar, K. V. G., and Rao, K. C.
Note on the estimation of starch in sugarcane.
Curr. Sci., 1958, 27: 218, bibl. 5.
Colorimetric and enzyme hydrolysis methods compared.

b Anon.
Variety trials—1957 season.
Cane Grs' quart. Bull., 1958, **22**: 14-26.
Results of 14 trials, including gross cash returns per acre less harvesting costs.

c Barreto Domínguez, R.
Resultados obtenidos en los estudios comparativos de variedades realizados por la Estación Experimental de la Caña de Azúcar de Jovellanos en la zafra de 1956. (III.) **(Results obtained in comparative varietal studies carried out by the Jovellanos Sugar cane Experiment Station on the 1956 harvest. III.)**
Mem. XXX Conf. anu. Asoc. Téc. azuc. Cuba, 1956, pp. 1-15, bibl. 1.
For previous parts see *H.A.*, 25: 4449h and 27: 1959g.

d Barrie, A. G.
A comparison of the yields of the major varieties in Babinda, 1957.
Cane Grs' quart. Bull., 1958, **22**: 6-8.
Q.57 outyielded Pindar and Badila in a district of relatively low yields and sugar contents.

e Becker, S.
The production of papain—an agricultural industry for tropical America.
Econ. Bot., 1958, **12**: 62-79, bibl. 8, illus.
Establishment, management, tapping, drying and economics.

f Busson, F., Garnier, P., and Dubois, H.
Contribution à l'étude chimique des cotylédons de *Cola nitida* (Chev.), Sterculiacées. **(Contribution to the chemical study of the cotyledons of *Cola nitida,* Sterculiaceae.)**
J. Agric. trop. Bot. appl., 1957, **4**: 657-60, bibl. 14.
The content of amino acids compared with that in [hen?] eggs.

g Charpentier, L. J.
Recent attempts to establish sugarcane borer parasites in Louisiana.
J. econ. Ent., 1958, **51**: 163-4, bibl. 2.
Only *Lixophaga diatraeae* has so far survived the winter; average parasitization of *D. saccharalis* 26%.

h Chen, J. C. P.
Cultivation practices on Thailand sugar plantations.
Sugar J., 1958, **21** (1): 14-17, illus.

i D[as], G. M.
Scavenging termites.
Ser. Tea Res. Inst. Tocklai, **94/1,** 1957, pp. 3.
Control of *Odontotermes* spp. damaging tea.

j Desneux, R.
Un palmier "pisifera" remarquable. **(A noteworthy *pisifera* oil palm.)**
Bull. Inf. I.N.E.A.C., 1958, **7**: 95-103, bibl. 5, illus.
Detailed description of P.21, which is both high-yielding and fertile.

k D[utta], S. K.
Vegetative propagation. Part II. Preparation of propagation beds and frames and treatment of shade.
Ser. Tea Res. Inst. Tocklai, **118,** 1957, pp. 5.
With estimated cost of lath frames [for part I see *H.A.*, 28: 3152].

l Entwistle, P. F.
Mealybugs in relation to cacao in Ghana. I. Their structure and life history.
Ghana Fmr, 1958, **2**: 12-15, illus.
Pseudococcus njalensis and other species.

m Forsyth, W. G. C., and Roberts, J. B.
Cacao "leucocyanidin".
Chem. Ind. Lond., 1958, No. 25, p. 755, bibl. 4.
Chemical composition investigated.

n Foster-Barham, C. B., and Pereira, H. C.
Drought and the tea bush. I and II.
Pamphl. Tea Res. Inst. E. Afr. **16,** 1958, pp. 31-42 and 43-5.
Methods of conserving water and minimizing drought effects discussed.

o Frémond, Y.
Le cocotier en Polynésie: perspectives de développement. **(The coconut palm in French Polynesia: prospects of development.)**
Oléagineux, 1958, **13**: 501-8, bibl. 10, illus.
Soils, fertility levels and suggestions for increasing yields.

p Herrera Vasconez, C., Guyot, H., and Cuillé, J.
Cercospora en Équateur. **(Leaf spot disease of bananas in Ecuador.)**
Fruits d'Outre Mer, 1958, **13**: 235-42, bibl. 7, illus.
The organization of a low-volume, aerial spraying campaign.

q Huet, R.
La composition chimique de l'ananas. **(The chemical composition of pineapples.)**
Fruits d'Outre Mer, 1958, **13**: 183-97, bibl. 15.
A detailed review.

r Jolly, A. L.
Cocoa farm management.
J. agric. Soc. Trin. Tob., 1956, **56**: 309-49, 479-503, illus. [Spanish translation in *Turrialba*, 1957, **7**: 88-94.]
Accounting, maintenance and improvement, production.

s King, K.
Soil ripper benefits pineapple crops.
Qd agric. J., 1958, **84**: 347-51, illus.
Subsoiling virgin and replant land.

t Lladoc, J. B.
A study of the cost of production of sugar in Ormoc, Leyte Province, in 1951-1952.
Araneta J. Agric., 1957, **4** (4): 10-32, bibl. 3.
Yields and cost analysis for the Philippines.

u Macari, A.
Seis años de riego por aspersión en caña de azúcar. **(Six years of sprinkler irrigation in sugar cane.)**
Mem. XXX Conf. anu. Asoc. Téc. azuc. Cuba, 1956, pp. 17-25, illus.
The equipment and its operation described and economic aspects discussed.

v Mendes da Ponte, A.
Aptidão des planaltos de Angola para a cultura do café arábica. Escolha do local para a plantação. **(Suitability of the high plains of Angola for arabica coffee. Choice of site for planting.)** [English summary ½ p.]
Rev. Café portug., 1957, **4** (16): 25-56, bibl. 27.
Climate and soils described and choice of sites discussed.

w de Menezes, O. B., and Nunes, W. de O.
Crescimento da *Hevea* na Baixada Fluminense. **(Growth of hevea in the Baixada Fluminense area.)** [English summary 1 p.]
Rev. Agric. Piracicaba, 1958, **33**: 13-20, bibl. 7.
Growth records in a part of Brazil in which hevea does not occur naturally.

x Miny, P.
Les plantations de caoutchouc du Congo belge. **(Rubber plantations of the Belgian Congo.)** [English summary 6 lines.]
Rev. gén. Caoutch., 1958, **35**: 741-4, illus.
History, present status and future prospects.

y Nyasaland Department of Agriculture.
Fertilizers for Nyasaland tea.
Memor. Nyasaland Dep. Agric., 1958, pp. 15.
Full recommendations on manuring tea of all ages.

z Parthasarathi, K., and Vijayasaradhy, M.
On the phenolic content of sugarcane and spontaneum juices.
Curr. Sci., 1958, **27**: 218-19, bibl. 5.
An improved method of determination described.

4157.

a Pineda, F.
Nemátodos parasíticos en la caña de azúcar. **(Nematode parasites of sugar cane.)**
Mem. XXX Conf. anu. Asoc. Téc. azuc. Cuba, 1956, pp. 3-81, bibl. 33, illus.
Types described with short notes on control.

b (Pominski, J., Spadaro, J. J., and Vix, H. L. E.)
Wax from domestic sugar cane.
Agric. Res. Wash., 1958, **6** (11): 10, illus.
A more efficient method of extraction using hot heptane.

c Rao, U. N., and Rao, N. V. M.
Care for cashewnut?
Indian Fmg, 1958, **8** (2): 7-11, illus.
Advice on establishing and growing the crop.

d Rhines, C. E.
Technical developments in natural rubber production.
Econ. Bot., 1958, **12**: 80-6, bibl. 5, illus.
A short review of recent research trends.

e S[armah], K. C.
Control of diseases of green crops.
Ser. Tea Res. Inst. Tocklai, **119**, 1957, pp. 5.
Used as cover crops in tea.

f Satyabalan, K.
Coconut breeding for improved varieties.
Coconut Bull., 1958, **12**: 72-5, illus.
Notes on dwarf × dwarf, tall × dwarf and tall × tall hybrids.

g Sills, V. E.
Chocolate flavour and the quality assessment of Fiji cocoas for 1955/56.
Agric. J. Dep. Agric. Fiji, 1957, **28**: 62-7, bibl. 4.
Data on samples from 65 selected varieties.

h Silva Araújo, A., and Ferreira, F.
Formação de cafèzal em contôrno. **(Contour planting of coffee.)**
Bol. Super. Serv. Café, S. Paulo, 1958, **33** (372): 8-18, illus.
Instructions for different gradients and soil types.

i Šipalov, M. S., Bokučava, M. A., and Soboleva, G. A.
The use of a densitometer for the quantitative determination of catechins, partitioned by paper chromatography. [Russian, with English summary 3 lines.]
Biohimija, 1958, **23**: 390-4, bibl. 10, illus.
Catechins in freshly plucked tea determined by the apparatus described.

j Story, C. G.
The new varieties Q.63 and Q.65.
Cane Grs' quart. Bull., 1958, **22**: 9-11, illus.
Descriptions and performances in trials with Q.50 and Q.58.

k Sylvain, P. G.
Ethiopian coffee—its significance to world coffee problems.
Econ. Bot., 1958, **12**: 111-39, bibl. 46, illus.
A survey, with notes on types of wild coffee as possible sources of disease resistance, etc.

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A drenagem nos cafèzais. **(Drainage in coffee plantations.)**
Bol. Super. Serv. Café, S. Paulo, 1958, **33** (371): 15-18, illus.
Simple and compound systems briefly described.

m U.S. Department of Agriculture.
1958-59 coffee crop expected to show sharp increase.
Foreign Agric. Circ. U.S. Dep. Agric. **FCOF 2-58**, 1958, pp. 10.
To 58·6 m. bags, 13% higher than estimated 1957-58 crop.

n U.S. Department of Agriculture, Foreign Agricultural Service.
World cocoa developments and outlook.
Foreign Agric. Circ. U.S. Dep. Agric. **FCB 3-58,** 1958, pp. 8.
World production for 1957-58 estimated at 1,725,000,000 lb. or 15% below 1956-57.

o U.S. Department of Agriculture.
World sugar production continues to rise.
Foreign Agric. Circ. U.S. Dep. Agric. **FS 3-58,** 1958, pp. 6.
To an estimated 50·1 m. short tons for 1957-58, 9·5% above 1956-57.

p Vayssière, P.
Le palmier à huile et ses insectes parasites en Malaisie. (**The oil palm and its insect pests in Malaya.**)
J. Agric. trop. Bot. appl., 1958, **5**: 197-223, bibl. 14, illus.
Mainly *Setora nitens*: biological and other control measures.

q de Verteuil, L.
Recent developments in cocoa hybridization.
J. agric. Soc. Trin. Tob., 1957, **57**: 437-45.
Early performance of the Amazonian and other hybrids.

r Walsh, N. M.
Some recommendations for the control of soil erosion in the planting of tea gardens.
Quart. Circ. Tea Res. Inst. E. Afr., 1958, **1**: 59-62.
Clearing and root removal.

s Wickizer, V. D.
Plantation crops in tropical agriculture.
Trop. Agriculture Trin., 1958, **35**: 171-80, bibl. 7.
A review of their history and development.

NOTES ON BOOKS AND REPORTS.

Books.

(*See also* 3796i, 3879.)

4158. Jacob, A.
Magnesium: the fifth major plant nutrient.
Staples Press, London, 1958, 8½×5½ in., pp. 159, bibl. 487, illus., 40s.

This book is a translation into English by Dr. Norman Walker of the German edition first published in 1955. In it, Dr. Jacob has succeeded in demonstrating the real importance of magnesium as a plant nutrient, not only for the maintenance of healthy foliage but also for the full production of crop yields. It is an ideal reference book and, as such, is easy to use, since each chapter is clearly headed and conveniently sub-divided. There is a comprehensive list of contents.

The first 5 chapters are devoted to the chemical properties of magnesium and its role in plant physiology. Deficiency symptoms are described in detail for at least 39 different plants, many of which are illustrated. Unfortunately, most of these illustrations are rather poor, and figure 2 appears to be printed in reverse. Symptomless deficiencies of magnesium are also discussed. A chapter on ion antagonisms deals not only with the well-known interaction between magnesium and potassium, but also with less well-established relationships, such as those between magnesium and manganese or magnesium and ammonium ions; emphasis is laid throughout the book on ion antagonism.

There is a short chapter on the importance of magnesium in animal physiology, and this is followed by 5 chapters concerned with estimation of magnesium in various soil types, its uptake by plants and the relative merits of many different magnesium-containing fertilizers. E.M.F.

4159. Kenneth, J. H.
A dictionary of scientific terms.
Oliver and Boyd, Edinburgh and London, 6th edition 1957, 9×6 in., pp. 532, 32s.

The dictionary is concerned with biology, botany, zoology, anatomy, cytology, genetics, embryology and physiology. The first edition by I. F. and W. D. Henderson appeared in 1920. Revision and expansion has now brought the number of terms dealt with to more than 14,000. Horticulture fares badly, as a glance at such simple terms as budding, rootstock, layer, etc., will reveal, but possibly this may be to the advantage of the horticulturist, who knows his horticulture but is not so well versed in other biological fields. Help is afforded in pronunciation and one agrees with the author that, despite all the pitfalls involved, such help is necessary and useful. The book is clearly printed and easy to use. D.A.

4160. Lee, F. P.
The azalea book.
D. Van Nostrand Co., Princeton, N.J., and London, 1958, 10×7 in., pp. 324, illus., 67s. 6d.

This book must be the most complete account so far produced of the azalea in horticulture. Written for the "serious American amateur" it will prove of interest and value to azalea growers anywhere. Botanically and horticulturally the azalea is entangled in a web of species, series, subseries, groups, alliances, hybrids and now "cultivars" beyond the powers of most amateurs, however serious, to unravel. Mr. Lee has clarified the situation materially. He distinguishes some 50 groups of horticultural origin apart from the true species. He gives the history and affinities of each group and describes all the principal varieties in it. It is a painstaking effort and occupies a large part of the book. The author is surely too pessimistic when he says after all this that the average amateur won't care a hoot. Other sections of the book are entitled "Azalea culture—a garden guide"; "Basic azalea horticulture—an analysis" and "Historical background" (starting in the Tertiary).

Within these pages is packed a really vast amount of information and some surmise. Nothing seems to have been forgotten, even to a chapter on suitable companion plants arranged for the climatic zones in which they can be expected to prosper and to appendices listing with chapter and verse azalea breeders in America, azalea nurserymen and azalea introductions by the U.S. Department of Agriculture. There is a 22-page index of named azaleas. If there is a weak spot it is in the colour plates, which are few and unworthy.

G.St.C.F.

4161. Mali, L.
Maatalouden Sanakirja **(Agricultural dictionary).**
Kustannusosakeyhtiö Otava, Helsinki, 1958, 10×7 in., pp. approx. 500, cloth £4, half-leather £5.

This dictionary, produced under the auspices of the Scientific Agricultural Society of Finland, should be of great value to all those who know any one of the languages Finnish, Swedish, German or English. Its basic language is Finnish, but the cross referencing from the indexes in the other languages appears to be so thorough that it can be used as a multilingual dictionary from any one of the languages named. Many [named] experts have assisted in the different countries. The aids to consultation such as symbols, abbreviations, etc., are clearly set out in all four languages. The editor and her staff have done a wonderful job for which we are very grateful. D.A.

4162. Moreton, B. D.
Beneficial insects.
Bull. Minist. Agric. Lond. **20,** revised 1958, pp. 49, bibl. 54, illus., obtainable H.M.S.O. Lond., 5s. 6d.

The author, a senior Advisory Entomologist of the National Agricultural Advisory Service, has practically rewritten this bulletin, almost twenty years after the publication of the previous edition. Since the war, the widespread use of many new insecticides has presented fresh problems in the upsurge of certain pests following the destruction of their natural enemies or the development of resistant strains, and this has stimulated the study of beneficial species. Predators and parasites occur in many insect families, and these are dealt with in systematic order. The fruit tree red spider mite is taken as an example of a pest that has become of economic importance within the last thirty years as a result of spraying, and some details are given of the wide range of predators associated with this pest. Parasites of the woolly aphid and of the glasshouse white fly are quoted as examples of beneficial species, the use of which has met with considerable success in England. Emphasis is placed on orchard insects, but it is made clear that beneficial species are of general occurrence, and that benefit can be derived from them by preserving naturally occurring species, as well as by the more spectacular method of importation.

This publication now covers a wider field than the title suggests, including some mention of predatory mites, and also of fungi, bacteria and viruses as parasites of insects. Four pages of coloured plates are extremely valuable for those who wish to learn to recognize friend from foe, and the provision of a bibliography and an index round off this review of current knowledge of beneficial insects. E.C.

4163. Spencer, E. R.
Just weeds.
Charles Scribner's Sons, New York and London, New expanded edition 1957, 9½×6½ in., pp. 333, bibl. 38, illus., 32s. 6d.

The chief purpose of this book on American weeds, most of them known elsewhere, as enunciated by the author is "to teach and to make interesting to any and all readers a few of the common forms of nature". It must be admitted that Professor Spencer seems to have great affection for many of the species described, for their many and curious names and for their endearing characteristics, thus of bedstraw (*Galium aparine* L.) he writes, "The roots make a red dye, and a wash made by boiling the stems is said to be good for sunburn and freckles." At the same time he includes accurate botanical descriptions in all cases, and he does not neglect to devote 10 pages to weed control by cultural and chemical means. The 102 illustrations by Emma Bergdolt are both decorative and useful for identification purposes. There is an excellent list of contents, an adequate index of names and a useful bibliography for further investigation by the still eager reader. D.A.

4164. Thomas, G. L., Jr.
Garden pools, water-lilies, and goldfish.
D. Van Nostrand Co., Princeton, N.J., and London, 1958, 9½×6½ in., pp. 222, illus., $5.95 or 45s.

Three Springs Fisheries in Maryland, U.S.A., is claimed by the author, who owns it, to be the largest source of ornamental fish and exotic water plants in the world. The 400 acres of pools, ponds and canals are crammed with 70 million ornamental and bait fish and hundreds of thousands of water lilies and other aquatics. There are no mosquitoes, because the fish eat them, and no fish-hawks, kingfishers, blue cranes, white cranes or fish ducks, because every worker has a loaded shotgun by his side. A pity perhaps, but, as the author says, the sight of one of his expensive 6-year-old brood fish floating in the sky in the talons of a fish hawk rather piques him.

The first part of the book is concerned with the construction, planting and maintenance of every sort of suitable container from a wooden tub to a small lake. Continuing, it turns into a very complete guide to the cultivated water-lilies both hardy and tropical. Such full information on the tropicals has not until now been compiled. The number of their varieties is nearly countless and, believe it or not, in the colder parts of America they are treated as annuals and replanted every year. To supplement the water-lilies there is a chapter on accessory aquatic plants. All the plants discussed are well known. There is also a chapter on diseases and pests (including snapping turtles).

Part II is a treatise on the breeding of fancy goldfish which, to one non-pisciculturist at least, seems to have everything. Incidental intelligence:—The Chinese goldfish is goggle-eyed like a Pekinese; the Japanese concentrates on flowing fin and tail formations.

G.St.C.F.

4165. THOMSON, R. H.
Naturally occurring quinones.
Butterworths Scientific Publications, London, and Academic Press, New York, 1957, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. vii+302, bibls extensive, 50s. (+2s. postage) or $9.00.

The large number of quinone pigments and their wide distribution in nature immediately raises questions concerning their biogenesis and function. Before an attempt can be made to answer these questions there must, of course, first be investigation of their structure. The main part of this book is devoted to an excellent account of the work of many chemists that has contributed materially to our knowledge of the structure of these pigments. It makes fascinating reading, as is always the case when a good writer leads one through the elegant logical steps used by the organic chemist at his best.

It is inevitable in the present state of our knowledge that a book concerned with any group of natural products should have most to say about structure. It is true that, with the advent of radioactive tracers, progress is being made on an ever increasing scale in the field of biosynthesis, but our ideas are still often based solely on known *in vitro* reactions.

When we come to the question of function we have to confess our ignorance. With the quinones we can, as the author suggests, ponder on their characteristic ease of reduction and reoxidation, speculate on their possible role in oxidation-reduction processes in living matter and wonder if they have some part to play as respiratory pigments. These and many other questions are aroused in the mind of the reader during the few pages of introduction and come up repeatedly throughout the rest of the book.

After the short introduction the book opens with an account of the benzoquinones. These occur mostly in fungi, relatively few having been found in higher plants, but a small group of alkyl derivatives occurs as secretions in certain insects. The work of Raistrick and his colleagues on the benzoquinones of micro-organisms is described, followed by an account of terphenyl derivatives. The chapter ends with a short discussion of dibenzoquinones.

The author next passes to a detailed account of the naphthaquinones. This includes a description of the interesting echinochromes and spinochromes found in sea urchins. The echinochromes are found principally in the eggs, ovaries and perivisceral fluid, and in combination with protein exhibit powerful chemotactic effects on spermatozoa at such enormous dilutions as one part in 3×10^{11} parts of sea water. The account of the naphthaquinones ends with the fascinating story of the vitamin K group.

We now come to the largest group of natural quinones —the anthraquinones. The use of plants as sources of dyes can be traced far back in history. The members of the Rubiaceae are especially rich in anthraquinones, which are useful mordant dyes, and a study of their chemistry is inevitably linked with the name of A. G. Perkin. Another great group of anthraquinones are fungal products and have been investigated by Raistrick. Insect pigments are also discussed, as are some dianthraquinones. After phenanthraquinones and miscellaneous quinones have been considered the book ends with a short account of Sir Alexander Todd's work on the aphins which are coronene derivatives and extremely complex.

There are three indexes provided—zoological, botanical and general. The book is well written and certainly no mere catalogue of facts. Any biochemist interested in the naturally occurring quinones will need to have it on his shelves, and the book is so pleasant to read that it will not spend much time on the shelf. A.E.F.

4166. UNITED NATIONS.
Proceedings of the international conference on the peaceful uses of atomic energy, held in Geneva, 1955. Vol. 12. Radioactive isotopes and ionizing radiations in agriculture, physiology and biochemistry.
United Nations, New York, 1956, $11 \times 8\frac{1}{2}$ in., pp. 553, bibls, illus., 9.00 or 63s.

This 12th volume in a series of 16, covers as its main topics:—isotopes in agriculture; radiation-induced genetic changes and crop improvement; tracer studies in agriculture; animal physiology; plant and general biochemistry. Of its 94 original papers, 5 from the U.S.A., 4 from Russia and 1 from Norway have been abstracted or noted separately. They include some work which, as far as we know, has not previously been published, for instance on systemic insecticides, radioactive herbicides, Co nutrition, and new techniques for investigating sugar cane nutrition and biosynthesis in various plants.

4167. WILSON, C. P. H.
Bush peaches.
Collingridge, London, and Transatlantic Arts, New York, 1958, $9\frac{1}{2} \times 6$ in., pp. 140, bibl. 61, illus., 42s.

The author of this delightful book on peaches admits that "most of the varieties grown in England as bush trees suffer from die-back and bud abscission", and that his own young trees "have been growing into die-back" as they mature rather than growing out of it. It would be wrong, therefore, to regard the book as a guide to the successful culture of peaches, because until die-back, a trouble of as yet unidentified cause, can be controlled, it remains the chief factor limiting commercial peach growing in England. This book is well worth reading, however, because it draws together what is known about peaches and their culture from ancient and modern publications. In this the author has been extraordinarily successful, and he seems to have missed little of modern research on this crop. Attention is drawn to the diversity of form of leaves, glands, flowers, buds, fruits and nodes, as well as to the practical points of propagation, pruning, soils, manuring, fruit thinning, the control of pests and diseases, choice of variety, and cold injury and requirements. It may be a little surprising that there is no reference to split-stone, a severe trouble of fruit in some seasons and one that the author is likely to meet as his own trees mature. The suggestion that "hot water treatment" of bud-sticks can deal with virus diseases in general is misleading. These are small blemishes, however, in a book that achieves a high standard of accuracy and presentation. There is a useful bibliography of over sixty titles for the serious reader and the book is pleasantly illustrated with line drawings and photographic plates. This is a book that once picked up is difficult to lay down. H.B.S.M.

Annuals and reports.

(*See also* 3622, 3740, 3796h, 3905-3907, 3973, 4116, 4142.)

4168. BERMUDA.
Annual Report of the Director of Agriculture for the year 1957, 1958, pp. 15.

Investigations in progress include the biological control of scale insects attacking oleanders, the control of Mediterranean fruit fly and of chlorosis of citrus and hibiscus, and strawberry variety trials. In work on weed control reference is made to the eradication of nutgrass in lily fields with 1% Kuron; the lilies suffered no damage.

4169. BUNDESANSTALT FÜR QUALITÄTSFORSCHUNG, GEISENHEIM. (SCHUPHAN, W.)
Bundesanstalt für Qualitätsforschung pflanzlicher Erzeugnisse (BAQ), Geisenheim Rheingau. Tätigkeitsbericht 1957/1958. **(Annual Report of the Federal Institute for Quality Research in Plant Products, Geisenheim, for 1957/1958)**, 1958, pp. 40, bibl. 25, illus.

First results, chiefly of trials with vegetables, concern plant proteins, the relationship between yield and the biological value of plant proteins, quality research and breeding, and finally the effect of plant-protective chemicals on quality. Research in progress on other projects is outlined.

4170. CAMEROONS DEVELOPMENT CORPORATION.
Annual Report of the Cameroons Development Corporation for the year 1957, Bota, Victoria, pp. 39, illus.

In the research division report (pp. 28-33) the following studies are included: *Bananas:* High fertilizer rates increased yields providing that the N: K ratio was 1: 3 or 1: 3·5; sprays of oil emulsion for leaf spot control were less liable than a pure oil to be toxic to banana plants; Lacatan bananas have been multiplied 16-fold in a year by splitting up and replanting twice a year, combined with adequate irrigation and manuring and "goosenecking" at 12 in. all plants when these were breast high. *Oil palms:* In a fertilizer trial, N and K both increased growth rate, while P only had an effect when combined with N and K. *Cacao:* Black pod disease was found to be most prevalent on high yielding trees. Other crops receiving attention are rubber, tea and black pepper.

4171. COMMITTEE OF PRIVY COUNCIL FOR AGRICULTURAL RESEARCH.
Report of the Agricultural Research Council for the year 1956-57, H.M.S.O., London, 1958, pp. 152, 7s.

The introduction to this first annual report of the A.R.C. consists of a summary of the origins and development of the Council and of its work in coordinating and directing research. This is followed by a section on administration and finance, and by reports on the work of the various agricultural research institutes and units, prepared by their respective directors and arranged under subject headings. In subsequent years it is hoped to present a series of articles by experts, each of which will cover a special field of the Council's activities.

4172. CRAFTS, A. S., MACHLIS, L., AND TORREY, J. G. (Editors).
Annual review of plant physiology. Vol. 9. Annual Reviews, Inc., Palo Alto, Calif., 1958, 9×6 in., pp. 510, bibls $7.00 U.S.A., $7.50 elsewhere.

This volume contains review articles on the following subjects: The quantum yield of photosynthesis, by R. Emerson. Physiology of salt tolerance, by L. Bernstein and H. E. Hayward. The naturally-occurring auxins and inhibitors, by J. A. Bentley. Destruction of auxin, by P. M. Ray. Metabolism of ascorbic acid in plants: Part I. Function, by L. W. Mapson. Physiology of the tobacco plant, by R. A. Steinberg and T. C. Tso. Mineral nutrition of tree crops, by W. Reuther, T. W. Embleton and W. W. Jones. The metabolism of amino acids and proteins in plants, by E. W. Yemm and B. F. Folkes. Auxin uses in the control of flowering and fruiting, by A. C. Leopold. Herbicides, by E. K. Woodford, K. Holly and C. C. McCready. Postharvest physiology of fruits, by R. Ulrich. The biogenesis of flavonoids, by L. Bogorad. Cytochromes in plants, by L. Smith and B. Chance.

4173. FORESTRY COMMISSION.
Report on forest research for the year ended March, 1957, H.M. Stationery Office, London, 1957, pp. 176, illus., 9s. 6d.

Although this report deals with forestry problems, the following items may be of interest to horticulturists also: conifer seed storage; tree nursery management and weed control; packing nursery trees in polythene for transport or storage; deer repellents and vole control; copper deficiency in poplars; physiology of flowering in trees, including the effect of position of the shoot in relation to gravity [see abstr. 3320]; shelterbelt research; experience with the tetrazolium viability test applied to conifer species.

4174. GEISENHEIM (STEINBERG, J.).
Lehr- und Forschungsanstalt für Wein-, Obst- und Gartenbau Geisenheim (Rheingau). Bericht für das Rechnungsjahr 1956/57. **(Annual Report of the Geisenheim Horticultural College and Research Station for 1956/57**, 1958, pp. 123.

Investigations reported include: *Department of Botany:* Flower biology of black currant, walnut, apple, almond, peach and apricot; iris seed germination. *Department of Plant Diseases:* (1) Vine: phylloxera tolerance; peronospora control and biology. (2) Fruit: *Ceratitis capitata, Stereum purpureum.* (3) Ornamental plants: Biology and control of *Pestalotia versicolor* in erica, *Fusarium oxysporum* in statice. *Department of Soils and Plant Nutrition:* Nutrition of *Erica gracilis, Azalea indica* and *Statice tatarica*; mulching of cucumbers; treatment of chlorotic fruit trees with a proprietary chelated chemical. *Department of Vine Breeding and Propagation:* Testing of new varieties for fruit maturity and frost resistance; the effect of Geisenheim rootstocks on yield and quality in relation to a standard rootstock; the yield and quality of French direct-producers; the protection of the graft union by chemicals; the promotion of rooting in grafted vines with the proprietary growth substance compound Florigen; the use of liquid fertilizers after the planting of grafted vines. *Department of Viticulture and Wine Making:* Manurial and spacing trials. *Department of Fruit Growing:* the treatment of nurse roots for the propagation of apple varieties; walnut propagation in the field and walnut varieties, strawberry varieties; studies on black currants. *Department of Horticulture:* Variety trials with chrysanthemum, *Coleus blumei*, primula, begonia, ivy, azalea and saintpaulia. *Department of Vegetables:* Variety trials with glasshouse and outdoor tomatoes; raising of tomato and cauliflower seedlings and pots for the latter; spacing trials with celeriac and pickling cucumbers; weed control in onions and carrots; soil fumigation for nematode control with Vapam. The report concludes with accounts of the *Departments of Garden Design, Management, and Agricultural Meteorology*.

4175. GEMBLOUX.
Rapport Général, Station de Recherches de l'État pour l'Amélioration des Plantes fruitières et maraîchères, 1957. **(General Report of the State Research Station for the Improvement of Fruit and Market Garden Crops, Gembloux, 1957)**, pp. 139, illus.

Work on the following subjects is described: *Top fruit:* collection of the principal varieties of apples and pears; pear pruning, interstock effects, fertility studies and hedge systems; apple cover crops, pruning and renovation; framework pruning of Golden Delicious; pruning mature James Grieve and Cox; weed control in young orchards. *Strawberries:* breeding, thermotherapy of commercial varieties, hot-water treatment for nematode control, propagation under virus-free conditions, time of covering with cloches, and comparisons between glass and plastic. *Vegetables:* breeding and selection of pea, tomato, bean, onion, spinach, chicory, cabbage, celery, carrot, lettuce and melon varieties; raising young tomato plants with artificial light; chicory plant development, nutrition, forcing and propagation. Freezing of fruits and vegetables; cold storage of glasshouse grapes.

4176. GHANA.
Annual Report of the Department of Agriculture for the year 1955-56, 1958, Accra, pp. 37, illus., 3s. 6d.

Research in progress includes the following: *Banana:* In one trial mulching produced better growth and earlier fruiting than NPK. *Citrus:* Rootstock trials for lime dieback resistance; the mealy bug, *Ferrisia virgata*, was shown to be an inefficient vector of the disease; dieback and little leaf symptoms were not transmitted by grafting. *Coconut:* N increased yield of nuts and kernel per palm. Studies of the "Keta" disease produced negative results. *Coffee:* Variety trials. Differences in bean colour were related to length of storage. *Oil palm, pineapple, sugar cane and tobacco:* Agronomic studies. The work of the *Cocoa Division* is reported fully and mainly concerns swollen shoot disease control and replanting, capsid control, manurial and variety trials, the provision of improved planting material and other activities undertaken in liaison with W.A.C.R.I.

4177. GLASSHOUSE CROPS RESEARCH INSTITUTE.
Annual Report 1956, Littlehampton, 1958, pp. 139, bibls, illus.

The "summary of research" (pp. 19-29) includes a discussion of work on tomatoes, soil tests, mushrooms, cucumber mildew, carnation wilt and red spider mite. Abstracts of papers published by the various departments appear in the appropriate sections of this number of *H.A.*

4178. INSTITUT DE RECHERCHES POUR LES HUILES ET OLÉAGINEUX (I.R.H.O.).
Rapport annuel 1956. **(Annual Report of the Institute for Research on Oils and Oil plants for 1956)**, Paris, 1957, pp. 111, illus.

Oil palms: Yields of selected strains were very satisfactory, the best being 3,456 kg. per ha. Foliar diagnosis of mineral deficiencies at Pobé has indicated a shortage of K and a secondary shortage of N which may be partially ameliorated by K application. Potash was also observed to increase leaf moisture content. Elsewhere K and Mg deficiencies were observed. In nursery studies mulching maintained a higher level of available soil moisture than irrigation. The length of the longest seedling leaf is closely correlated with fresh weight of aerial parts. Low plant Mn contents were found in areas where *Fusarium* disease was prevalent. Blast disease in the nursery mostly affects plants between 6 and 12 months old; planting in baskets in the shade reduced blast attack. Chemical and technological oil studies are also reported. *Coconuts:* Selection work is now sufficiently advanced for cross breeding to be undertaken. Dwarf varieties have been introduced. Potash shortage, probably accompanied by Mg shortage, has been observed. Old palms have shown N shortage. Kaincopé disease seems to be of virus origin. *Shea butter trees:* Nursery and establishment techniques, extraction studies. *Castor:* Selection and breeding, decortication studies.

4179. INSTITUUT VOOR TUINBOUWTECHNIEK, WAGENINGEN.
Jaarverslag 1957, Instituut voor Tuinbouwtechniek, Wageningen. **(Annual Report of the Institute for Horticultural Engineering, Wageningen, for 1957)**, pp. 66, illus.

Progress reports and results are given of studies on the following: Comparisons of various types of glass and plastic for frames; stakes for supporting blackberries and raspberries; black polythene as a soil covering for frame cucumbers; light measurements for fluorescent lights; supplementary lighting for tomatoes; economic aspects of types of glasshouse; soil sterilization; the influence of heating systems on tomato growth and yields; forcing chicory; subirrigation for pot plants (*Gloxinia*); soil consolidation by machines in orchards and bulb fields; preservation of boxes for mushroom growing; a work study on cabbage planting; tests with a mechanical pulley; studies on picking apples and strawberries.

4180. JAMAICA.
Investigations 1955.
Bull. Dep. Agric. Jamaica **55,** 1957, pp. 106, 3s. 6d.

Progress reports on investigations include: *Economic entomology:* pests of sugar cane, bananas, citrus. *Field crops:* sisal fertilizer and spacing trial. *Plant pathology:* diseases of sugar cane, bananas, brassicas, cacao and coconuts. *Cultivated trees, shrubs and vines:*

banana breeding and management experiments, cacao varietal studies, cashew selection, citrus propagation and management trials, coconut management, coffee selection and cultivation trials, pineapple varietal and fertilizer trials, pimento pruning, mango and avocado propagation and establishment.

4181. John Innes.
48th Annual Report of John Innes Horticultural Institution, 1957, Bayfordbury, 1958, pp. 47, 3s.

Reports on research in progress include the following: *Plant Breeding:* mildew resistance in the apple, a dwarfing cherry rootstock, everbearing strawberries, hybrid tomatoes, gametogenesis in Beurré Bedford pear, control of flower number in tomato, species crosses in strawberry, apomixis in *Rubus*, wild raspberries, rose stock trials and aneuploid *Canina* roses. *Genetics:* effect of environment on quantitative characters, pigments of *Primula sinensis*. *Physiology and plant culture:* tomato growth and development, studies of growth in potting composts, soil aggregates and in growth rooms and glasshouses. *Descriptions of Merton fruits:* Merton Worcester and Merton Beauty apples, Merton Glory cherry.

4182. Kenya.
Annual Report Department of Agriculture, 1957, Vol. 1, 1958, pp. 58, 4s.

Research, briefly reported, includes: *Coffee:* control of antestia, leaf miners and white stem borer, nitrogen nutrition, coffee berry disease, vegetative propagation [see also *H.A.*, 28: 4200k]. *Pyrethrum:* breeding, pest, disease and weed control, stripping trials, fertilizer and irrigation trials. *Sisal:* management studies, fertilizer trials and weed control. *Sugar cane:* variety trial. *Horticulture:* pineapples, citrus, berry fruits, vegetables. *Plant pathology:* woodiness disease of passion fruit. *Entomology:* various projects.

4183. Kimberley Research Station, Western Australia.
Kimberley Research Station. A progress report, November, 1957.
J. Agric. W. Aust., 1958, **7**: 239-57, illus.

The report describes the progress of the Kimberley Research Station, which was established in 1945 under the joint control of the C.S.I.R.O. and West Australian Department of Agriculture. It is situated on the Ord River in the north-eastern part of Western Australia. The report includes a section on sugar cane, a crop relatively new to Western Australia but one which is considered likely to meet future needs as the population expands. Variety trials and preliminary fertilizer and other investigations are described, which indicate that under Kimberley conditions sugar production can be achieved with much the same yield level as at Burdekin in Queensland. The Ord River region seems ideally suited to sugar production. Among 13 varieties under trial Pindar and P.O.J. have so far given the highest yields. Other crops under trial include rice and other cereals, cotton, oilseeds and pasture and fodder grasses. Most types of fruit introduced have shown little promise.

4184. Michigan.
Ninety-sixth Annual Report of the Secretary of the State Board of Agriculture, State of Michigan, and Seventieth Annual Report of the Agricultural Experiment Station, July 1, 1956, to June 30, 1957.
Mich. St. Univ. Publ., 1958, **52** (12): 1-449.

Brief reports on advances during the year, given on pp. 146-151, include: Maggot control in spinach with granulated formulations of dieldrin and parathion; protection of celery against blight by copper-sulphate dust alternated with carbamates, especially ziram and maneb; couch grass control with 20 lb. of dalapon supported by 10-lb. treatments in June and fertilization one month before the first treatment; 100% control of Canada thistle with 6 lb. aminotriazole; control of certain weeds in 7–10 feet of water by dropping 2,4-D ester pellets (20 p.p.m.) on lake ice in March; the effect of temperature and fungicides on fruit quality in apples; apricot breeding for Michigan conditions.

4185. Mississippi Agricultural Experiment Station.
70th Annual Report for the fiscal year ending June 30, 1957, of the Mississippi Agricultural Experiment Station, pp. 94, illus.

Horticultural research in progress includes: *Vegetables and Truck Crops Branch Station:* selection and breeding of new varieties, tomato irrigation, pest and disease control, chemical weed control, cultural and fertility studies, greenhouse investigations, winter tomato production. *Ornamentals:* propagation and forcing studies. *Fruits:* breeding and selection of apples, pears, grapes, peaches, raspberries and strawberries, disease control.

4186. National Institute of Agricultural Engineering (The British Society for Research in Agricultural Engineering).
Annual Report of the National Institute of Agricultural Engineering, 1956-57, pp. 72+Suppl. pp. 18, illus.

Departmental reports on current investigations include the following of horticultural interest: *Agricultural testing:* sprayers and dusters, irrigation pumps and equipment. *Horticultural engineering:* glasshouse irrigation, heating and ventilation, transparent plastic films for crop protection, water requirements of plants under glass, propagation of cuttings under intermittent mist, measurement of radiation, flame machine for weed control and soil hygiene in bulb growing, fruit spraying investigations, droplet size and other aspects of spraying, vegetable washing. *Mechanical engineering:* hop drying. *Soil:* carrot topping.

4187. Nigeria, Federation of.
Annual Report of the Department of Agricultural Research for the year 1956-7, 1958, pp. 48, 9d.

Investigations in progress include the following:—*Cacao:* seedling wilt, capsid studies. *Citrus:* rootstock trials, gummosis disease. *Kola:* breeding work. *Pineapples:* fruitlet brown rot disease. *Tomatoes:* variety collection, including promising introductions from Italy.

4188. ROTHAMSTED (LAWES AGRICULTURAL TRUST).
Report of the Rothamsted Experimental Station for 1957 (with 50-year index, 1902-57) Harpenden, 1958, pp. 316, 10s.

Items on manuring of oil palms, chelated iron in pea nutrition, boron and root initiation, partial defoliation, virus diseases and mitochondria of tobacco, apple scab, pea wilt, earthworms in orchards and bracken control are abstracted separately. The report also includes accounts of large-scale processing of leaf protein, research on plant viruses, control of *Aphis fabae* and other research on insecticides. Studies on the effect of gibberellic acid and kinetin on leaf growth and net assimilation rate have been described elsewhere [*H.A.*, 28: 2109].

4189. SAANICHTON DOMINION EXPERIMENTAL FARM.
Summary report 1957.
Publ. Saanichton Domin. exp. Fm **169**, 1958, pp. 10.

Summaries of progress are included on: *Vegetable crops:* chemical control of clubroot in cabbage and variety trials. *Chemical weed control* in strawberries and bulbs. *Tree and small fruits:* strawberry breeding, dwarf apple tree culture. *Ornamentals:* chrysanthemum selection and culture, heat curing of bulbous iris. *Machines and equipment:* holly packaging device, design of plant growth chambers.

4190. SCOTTISH HORTICULTURAL RESEARCH INSTITUTE.
Fifth Annual Report, 1957-1958, Mylnefield, 1958, pp. 51.

Work in progress includes: *Pomology:* Breeding raspberries and black currants; raspberry spacing, height of winter tipping, single or double planting, degree of thinning out, frequency of picking, arching over canes at tipping height, training, and time of planting; weed control in cane nurseries; variety trials with top fruits, currants and regional fruit trials; control of bacterial canker of plums. *Vegetable culture:* Variety trials with beans (french and broad), peas (canning and sugar), cabbages, sprouts, broccoli, spinach, celeriac, leaf-celery, parsnip-rooting parsley, and carrots; breeding sprouts, cabbages and beans; preliminary selection of cabbage transplants for time of maturation. *Crop physiology:* Effects of seasonal changes in light intensity and temperature on vegetative growth of broad bean and sunflower; effect of photoperiod on strawberry growth, effect of leaf maturity on flowering, effects of growth substances on autumn flower initiation, and cold storage of runners. *Genetics:* Spring chlorosis of strawberries; irradiation of brassica seed; varietal crosses in black currants. *Virology:* Behaviour of tannins in infected raspberry leaves; soil transmission of raspberry ring spot, raspberry yellow dwarf and beet ring spot; virus-free raspberry stocks, and spread of viruses in strawberries. *Mycology:* Autecology and control of *Botrytis cinerea*; host-parasite relationships of red core. *West of Scotland Unit* (*Auchincruive*): Strawberry breeding; mycological investigations on *Phytophthora fragariae*; June yellows. A report on variety trials with spinach at Invergowrie is included.

4191. STATION D'AGRONOMIE ET DE BIOCHIMIE VÉGÉTALE, ANTIBES. (DROUINEAU, G.)
Dix ans de travaux, 1946-1956. Résumés. **(The Agronomy and Plant Biochemistry Station, Antibes. Ten years' research work 1946-1956. Abstracts.)** Institut National de la Recherche Agronomique, 1958, pp. 85, illus.

This publication consists of detailed abstracts of 46 papers published by the staff of the Antibes station since 1946. They are grouped under 4 main headings, namely, Methods and techniques, Soil science, Plant nutrition, and Plant physiology. They are very largely concerned with investigations on the manuring, growth and composition of fruit, vegetable and flower crops grown on the calcareous soils of the Riviera.

4192. TANGANYIKA.
Annual Report of the Government Chemist, 1957, 1958, pp. 9, 1s. 6d.

Minor nutrient studies on various crops have included the following: *Wattle:* dieback was due to B deficiency. *Coffee:* B and Zn sprays eliminated dieback and black tip and increased yields. Mg and Zn deficiencies are being investigated. Work on irregular bearing shows an apparently related variation in Ca, B and K contents. *Pyrethrum:* study of relation of leaf composition to flower flush. *Coconuts:* tapering disease is apparently not related to B shortage. *Tobacco:* brittle-leaf samples showed Cu shortage. *Citrus:* Zn and Cu shortages have been encountered.

4193. TUNISIE, SERVICE BOTANIQUE ET AGRONOMIQUE.
Rapport sur les travaux de recherche effectués en 1956. (**Report on research work conducted in Tunisia in 1956**), Vols I and II, pp. 230 and 255 (cyclostyled).

Progress reports include the following: *Market garden crops laboratory:* tomato selection and breeding, introduction of new vegetable varieties. *Agricultural entomology station:* studies on Mediterranean fruit fly, including baits, and biological control of broad-bean aphid. *Fruit growing laboratory:* varietal introductions, vegetative reproduction of pistachio, apricot breeding, olive plant production, a nematode-resistant almond rootstock. *Viticultural and fruit growing laboratory of the École supérieure d'Agriculture de Tunisie* [*E.S.A.T.*]: vine selection and breeding. *Botanical laboratory of the E.S.A.T.:* disease control in vegetable crops, apricot, capsicum, artichoke. *Olive research station:* regeneration of plantations, cultural, manurial and varietal studies.

4194. UNIVERSITY OF NOTTINGHAM.
Report of the School of Agriculture, University of Nottingham, 1957, 1958, pp. 80, bibls, illus.

A summary of progress in research projects is followed by short articles on various aspects of the work. The only one of horticultural interest is "Effects of soil salinity on glasshouse crops", by D. W. T. Clay and J. G. Davison [see abstr. 3630].

4195. WISCONSIN.
What's new in farm science, ***being 73rd Annual Report, Part II, Wisconsin Agricultural Experiment Station for 1955/56,*** Madison, 1957, pp. 102, illus., issued as *Bull.* **527.**

Horticultural subjects discussed include: *Fruit and vegetables:* Accumulation of DDT in orchard soils; increased resistance to fire-blight in Wisconsin's standard apple varieties; susceptibility of stone fruits to elm mosaic; weed control in cranberries by hormone herbicides; strawberry manuring and varieties; aphid control on peas; two new disease-resistant canning pea varieties; host plants of pea enation virus; a machine for sowing peas; weed control in peas; control of damping-off and of 4 bean fungus diseases by oligomycin; spacing of lima beans; nitrogen nutrition of onions, two new onion hybrids; weed competition in onions; Wisconsin Chief, a new tomato variety of very high quality; manganese and other minor elements for beetroot; dalapon for the control of couch grass in vegetables. *Tobacco:* A new mosaic-resistant variety of binder-type cigar tobacco; tobacco spacing; sulphate and chloride nutrition in relation to quality; cover crops. *Flowers and lawns:* Renewal of Krilium treatment for flower crops; crabgrass control in lawns; aster variety Dwarf Queen; lily varieties for growing as pot plants; bulb treatment and cold storage of Easter lilies; an increase in poinsettia production by an improvement of propagation methods; magnesium deficiency in poinsettia; weed control in evergreen nurseries by monuron.

New periodicals.

4196. FACULTY OF AGRICULTURE, UNIVERSITY OF AIN SHAMS, CAIRO.
Annals of Agricultural Science [*Ann. agric. Sci. Cairo*], 1956, 9½ × 6½ in., Vol. **1,** No. 1, pp. 165, illus.

Experimental work on many aspects of agriculture and horticulture is reported in this journal. In this first number subjects covered include: the effect of sugar concentration on rate of softening of dates; the effect of N and dusting with S on spread of powdery mildew and growth of squash plants; the effect of rootstock on composition of Le Conte pears; root distribution of citrus rootstocks; foliar sprays to prevent sprouting of gladiolus corms; the effects of nutrition and soil moisture on *Botrytis fabae* infection of broad beans. These articles have all been noted from another source in *H.A.*, Vol. 28, No. 3. The papers are in English with Arabic summaries. There is no information in this number on frequency of publication or subscription rates.

4197. ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE.
New Zealand Plants and Gardens [*N.Z. Plants and Gdns*], 1955-56, Vol. I, Nos. 1-4, pp. 100, illus., and 1956-58, Vol. II, Nos. 1-7, pp. 328 (smaller format), illus., published by the Royal New Zealand Institute of Horticulture, Secretary, K. J. Lemmon, Suite 1, First Floor, British Sailors' Building, 10 Brandon St., Wellington, price 2s. 6d. per number.

The quarterly *Journal of the New Zealand Institute of Horticulture* ceased publication in 1947, when it was decided that the Institute should publish articles of general interest in *The New Zealand Gardener* and articles of a more technical nature in its Annual Reports or as separate bulletins. Gradually, however, the need was felt for a publication on similar lines to that of the R.H.S. in England, so in 1955 another quarterly was started, *New Zealand Plants and Gardens*. It is the policy of this journal to collect and publish material outside the scope of Government Departments or commercial periodicals. This will include specialized articles on the various genera, articles on practical horticulture by experienced growers, notes on New Zealand gardens of particular beauty or interest, reviews or technical articles by overseas contributors on work in their own field, plant notes and book reviews. The new format, used for Volume II, is neat and attractive.

4198. SHELL PETROLEUM COMPANY LTD.
Span. [*Span*], April and July 1958, Nos. 1 and 2, pp. 32 and 36, bibls, illus., Shell Public Health and Agricultural News, St. Helen's Court, Great St. Helen's, London, E.C.3.

As a glance at the address given above shows, *Span* stands for Shell Public Health and Agricultural News. It succeeds the *Shell Agricultural News*, and the change of title denotes a widening of the field to be covered. As might reasonably be expected the articles published are for the most part reviews concerned with chemicals and methods of applying them. They are written both by members of the Shell staff and by outside experts, and, in these first two numbers, deal with the control of pests and diseases and with other problems affecting a wide variety of crops, both temperate and tropical.

4199. SOUTH AFRICA DEPARTMENT OF AGRICULTURE.
South African Journal of Agricultural Science [*S. Afr. J. agric. Sci.*], 1958, Vol. 1, No. 1, pp. 108, bibls, illus. Division of Publicity, Department of Agriculture, Private Bag 144, Pretoria, 7s. 6d. per number.

Now that *Farming in South Africa* is a purely popular and advisory journal this new publication deserves a particular welcome as a repository for the cream, scientifically speaking, of the papers that emanate from South African research stations and universities. Most of the 6 articles in this first number are in English, one is in Afrikaans, but all have summaries in English, Afrikaans and French. One of them has excellent colour illustrations. Four of them have been abstracted separately.

Noted.

4200.

a ARIZONA.
Annual Report of the Arizona Agricultural Experiment Station for the 67th year ending June 30th, 1956, 1957, pp. 19.
Lists of projects, publications and staff.

b British Columbia.
Agricultural Statistics Report for the year 1955, 1957, pp. 37.

c Deutscher Pflanzenschutzdienst.
Jahresberichte der Pflanzenschutzämter 1956. **(Annual Reports of the [West German] Plant Protection Services for 1956)**, Biologische Bundesanstalt für Land- und Forstwirtschaft, Braunschweig, 1958, pp. 244.
Occurrence and control of pests and diseases.

d Dominica.
Annual Report of the Department of Agriculture and Forestry, 1954 and 1955, pp. 15.

e FAO.
Yearbook of Food and agricultural Statistics, 1957, Vol. XI, Part 1, Production. [English and French, with Spanish notes and glossary], Rome, 1958, pp. 452, $3.50 or 17s. 6d.

f Gaebler, O. H. (Editor).
Enzymes: units of biological structure and function.
Academic Press Inc., New York, 1956, 9 × 6 in., pp. 624, bibls, illus., $12 or 86s.
The proceedings of an international symposium held at Detroit in 1955.

g Hirst, F. C.
Books on agriculture and horticulture.
Bull. Minist. Agric. Lond. **78,** 1958, pp. 96, H.M.S.O., 5s. 6d.
A classified list of publications in the Ministry's Main Library.

h Horticultural Education Association.
H.E.A. Annual Report, 1957, 1958, pp. 55, obtainable from Editor, 65 Tilehurst Road, Reading, Berkshire.

i Imperial College of Tropical Agriculture.
Report of the Governing Body and the Principal's Report for 1956-57, 1958, St. Augustine, Trinidad, and 40 Norfolk Street, London, W.C.2, pp. 63, illus.
Including short accounts of banana and cacao research.

j Jordan Ministry of Agriculture. (Goodman, A. T.)
Sixth Annual Report of the Agricultural Research Service of the Ministry of Agriculture for the year 1957, Deir Alla, 1958, pp. 60.
Variety and cultural trials with castor beans and safflower.

k Kenya.
Annual Report Department of Agriculture, 1956, Vol. II—Record of Investigations, 1958, pp. 181, 7s. 6d.
For a brief preliminary report see *H.A.*, 28: 995; for later work see abstract 4182.

l Lawalrée, A., and Legrain, J.
Flore générale de Belgique. Spermatophytes. Vol. III. Fasc. 1: Rubus. **(A general flora of Belgium. Spermatophytes. Vol. III, Part 1: *Rubus***
Minist. Agric. Jardin bot. État, Brux., 1958, 10 × 6½ in., pp. 152, illus., 300 or 500 Fr. Belg., depending on quality of paper.
See *H.A.*, 28: 1015i and earlier for previous parts.

m Ministry of Agriculture, London, Department of Agriculture, Scotland, and Ministry of Agriculture, Northern Ireland.
Agricultural statistics 1956/1957, 1958, pp. 38, H.M. Stationery Office, London, 3s. 6d.
Including acreages and production figures for fruit and vegetables.

n New York State.
Seventy-sixth Annual Report New York State Agricultural Experiment Station, Geneva, 1957, 1958, pp. 28.
Lists of publications and projects.

o Nigeria, Northern Region.
Advance Copy Annual Report, Department of Agriculture, Northern Region of Nigeria, for 1955-56. Part II. Research and Specialist Services, pp. 152 (cyclostyled).
Includes variety trials of sugar cane and tobacco.

p Nigeria, Western Region.
Third Annual Report of the Western Region Marketing Board, 1st October, 1956, to 30th September, 1957, 1958, pp. 70, 9d.
Crop products include cacao, oil palm produce and fresh fruit.

q Northern Rhodesia.
Annual Report Northern Rhodesia Department of Agriculture for 1957, Lusaka, 1958, pp. 21, 2s. 6d.
Mainly African agriculture.

r Nyasaland.
Annual Report of the Department of Agriculture for the year ended 31st December, 1957, (Part I), 1958, pp. 38, illus., 4s. 6d.
Administrative report on agricultural conditions in the territory.

s Purdue University.
Annual Report Purdue University Agricultural Experiment Station, 1955/56, 1956, pp. 46.
Articles published and financial statement.

t Republic of Ireland.
Twenty-sixth Annual Report of the Minister for Agriculture, 1956-57. Dublin, Govt Publs Sale Office, 1958, pp. 255, 7s. 6d.

u Robyns, W., and others.
Flore du Congo Belge et du Ruanda-Urundi. Spermatophytes. Volume VII. **(Flora of the Belgian Congo and Ruanda-Urundi. Spermatophytes. Volume VII.)**
Institut national pour d'Étude agronomique du Congo belge, Brussels, 1958, 10 × 6½ in., pp. 367, illus.

v RURAL INDUSTRIES BUREAU.
The Annual Report of the Rural Industries Bureau from April 1957 to March 1958, London, 1958, pp. 64, illus., 1s. 6d.
Under Basketry (pp. 42-3) work on processing, drying and tying willows is briefly reported.

w SCOTTISH SOCIETY FOR RESEARCH IN PLANT BREEDING.
Report of the Scottish Plant Breeding Station, 1958, pp. 81, bibls, illus.
Report and occasional papers, mainly concerning field crops.

x STUBBE, H. (Editor).
Inhalts- und Sachverzeichnis für die Bände 1-25 (1929-1955). **(Author and subject index for the volumes 1-25 (1929-1955).)**
Züchter, 1958, 5. Sonderheft, pp. 57.

y U.S. DEPARTMENT OF AGRICULTURE.
Report of the Secretary of Agriculture, 1957, Washington, 1958, pp. 68, 30 cents.

z U.S. DEPARTMENT OF AGRICULTURE (ELTING, E. C.).
Report on the State Agricultural Experiment Stations, 1957, 1958, pp. 16.
List of stations and financial statements.

4201.

a U.S. DEPARTMENT OF AGRICULTURE.
Workers in subjects pertaining to agriculture in land-grant colleges and experiment stations 1957-58.
Agric. Handb. U.S. Dep. Agric. **116**, 1958, pp. 235, obtainable from Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 65 cents.

b WISCONSIN.
What's new in farm science, being ***74th Annual Report, Part I, Wisconsin Agricultural Experiment Station for 1956/57,*** Madison, 1958, pp. 77, illus., issued as *Bull.* **529.**
Mainly livestock; for horticultural work in 1955/56 report see abstract 4195.

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